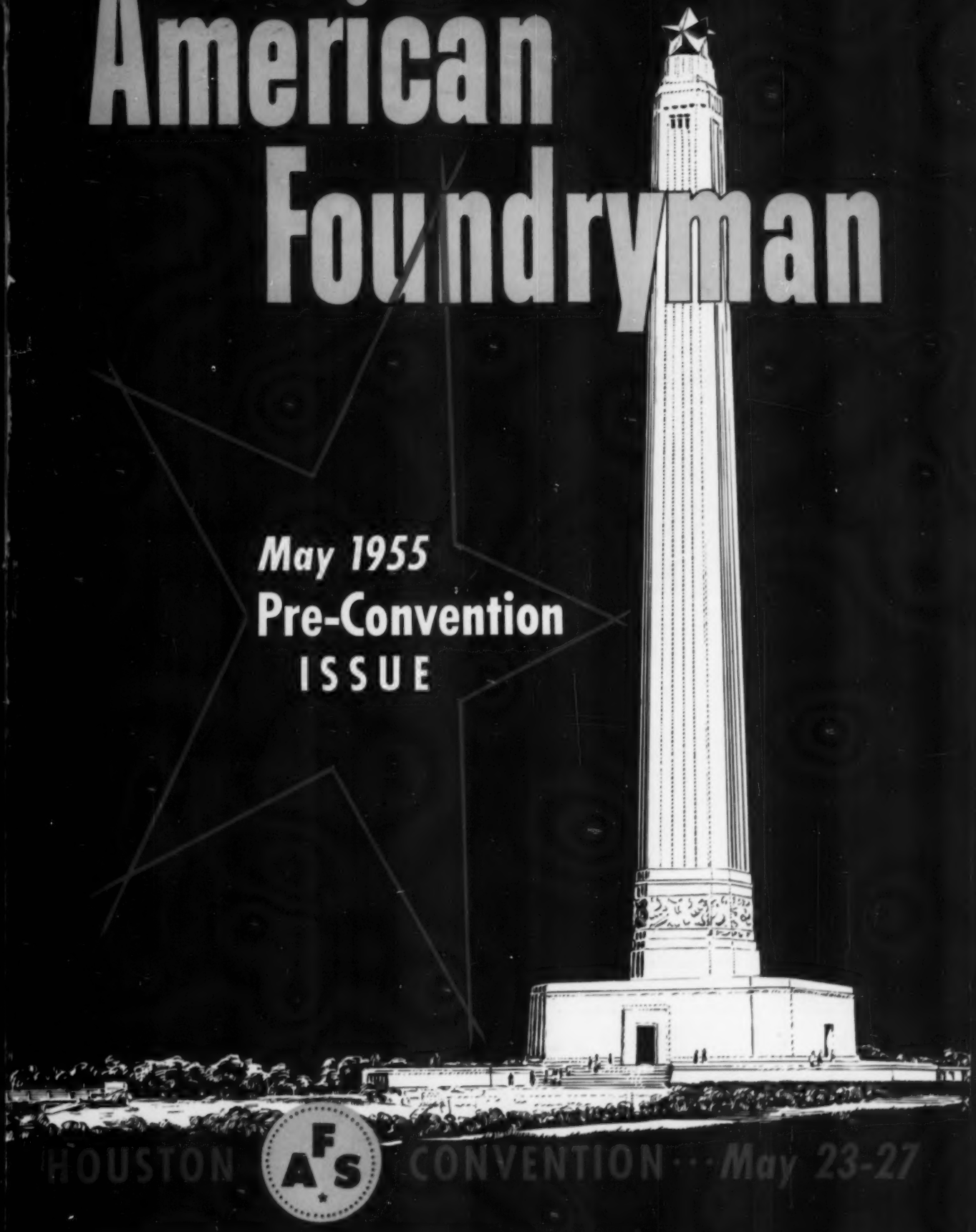
American Foundryman



May 1955

Pre-Convention

ISSUE

HOUSTON CONVENTION · · · May 23-27

"We're melting everything under the sun with our LECTROMELT* FURNACE"

says:

M. C. Stephens, Jr., Melting Supervisor
Ross-Meehan Foundries
Chattanooga, Tenn.

This size P. T. furnace rated at 3½ tons per hour is the larger of two Lectromelts which are contributing to the versatility of Ross-Meehan Foundries' operation.

"We're a job foundry.
It's good business to be so versatile."

". . . Out of 11 heats turned out in 17 hours of one day, eight were of different alloys. Every day we produce three to five different metals as standard procedure, including Ni-Resist, 28 chrome and Meehanite. And the ease of making a special heat of steel in a Lectromelt* Furnace helps us a lot. It seems that everything about a Lectromelt is just right for our production."

This production man is talking about his foundry job. He has seen the value of precise control of temperature and analysis made possible with a Lectromelt Furnace. The flexibility of production, the versatile nature of a Lectromelt and the matter of casting special heats and special alloys daily . . . these could make your foundry more efficient and capable—could let you go after more profitable castings business.

Write for Lectromelt Furnace Catalogue No. 9. Request any engineering information you require. Pittsburgh Lectromelt Furnace Corporation, 316 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . GERMANY: Friedrich Kocks GMBH, Dusseldorf . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

For more facts, circle No. 316 on postage-free Reader Service card on p. 47 or 48

HERE'S ALL YOU NEED

If it's easier, better sand control you're after—here's the answer! These three materials, added in varying amounts to sand (dry or in slurry), will give you *close control* over green and dry strength and carbon content, and also provide GREATER FLOWABILITY and LESS LUMPY SHAKEOUT!

GREEN BOND Bentonite excels in developing and controlling green and dry strength. Its medium to low viscosity cuts down on mulling time and permits slurry users to add more bentonite per gallon of slurry, without strain on the pumping system. CROWN HILL Seacoal is exceptionally low in sulphur content, which means your castings will have more easily machined surfaces. Federal SAND STABILIZER improves the flowability of sand and eliminates lumps in sand shakeout. It burns out faster than any other facing material. Since it has a very low ash content and has no deteriorating effect on sand, you can re-use your molding sand *safely*.

And this is important—these advantages, plus many others, are yours at low cost. For these sand additives will actually cost you *less than $1.00 per ton of castings produced!* To learn more about them, write for your copy of *"Tailor-Made Molding Sands"*.

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

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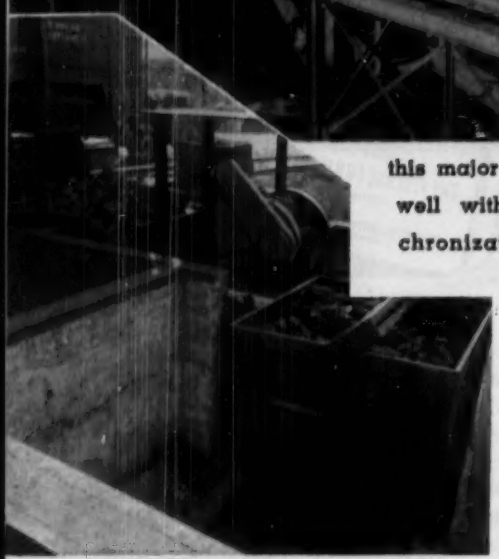
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON, WYO.

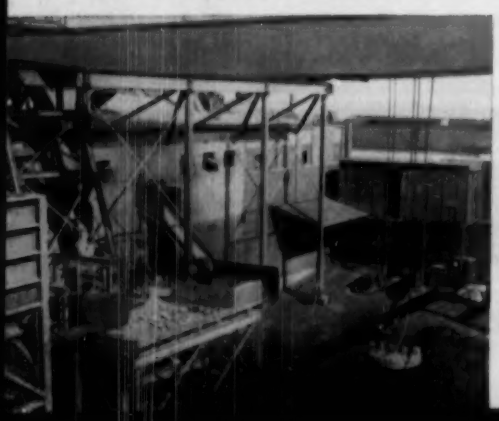
Costs on CHARGING and MELTING Are Down Because

this major producer* of castings has planned well with MODERN engineers in the synchronization of every handling operation:



The 165 cu. ft., self-tripping bucket conveys coke and stone, by crane, from car unloader to bin and batch larry. Scrap and pig are charged directly into the weigh hopper.

*Lakey Foundry Corporation, Muskegon, Michigan is a major producer of grey iron castings for the automotive, agricultural and household appliance industries.



All components flow mechanically from gondola cars, through MODERN 108" cupolas, to the molds on the pouring floor. Undercar unloaders . . . coke and stone buckets . . . bins . . . hoppers . . . scales . . . MODERN Small-Cone charging bucket . . . inclined-swivel charger and the melting equipment team together to pull down costs while boosting the over-all quality.

Much of this controlled, time-proved mechanization is described in bulletin S-147-B. A note on your letterhead will start our thinking about ways to cut your costs RIGHT NOW while we're planning together for tomorrow's expansion . . .

MODERN EQUIPMENT COMPANY
Port Washington, Wisconsin

American Foundryman

Volume 27 *May 1955* *Number 5*

Published by American Foundrymen's Society

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AFS Headquarters

Golf & Wolf Roads
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Wm. W. Maloney
General Manager

American Foundryman

H. F. Scobie, *Editor*
J. M. Eckert, *Advertising Manager*
G. J. Minogue, *Production*

Contributing Editors

H. J. Heine, *Technical*
W. N. Davis, *Safety & Hygiene & Air Pollution Control*
A. B. Sinnett, *Education*

Advertising Representatives

MIDWESTERN—Dwight Early & Sons
100 N. LaSalle St., Chicago
CEntral 6-2184

EASTERN—Weston and Weston
6 E. 39th St., New York
Murray Hill 5-9450

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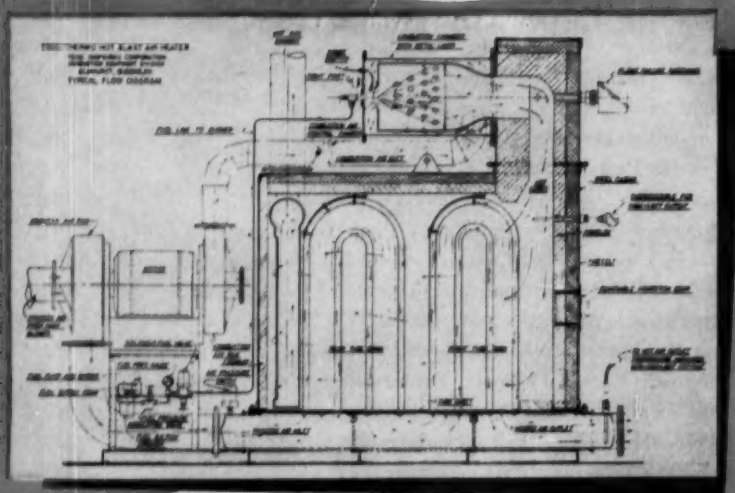

TODD NEW YORK U.S.A.

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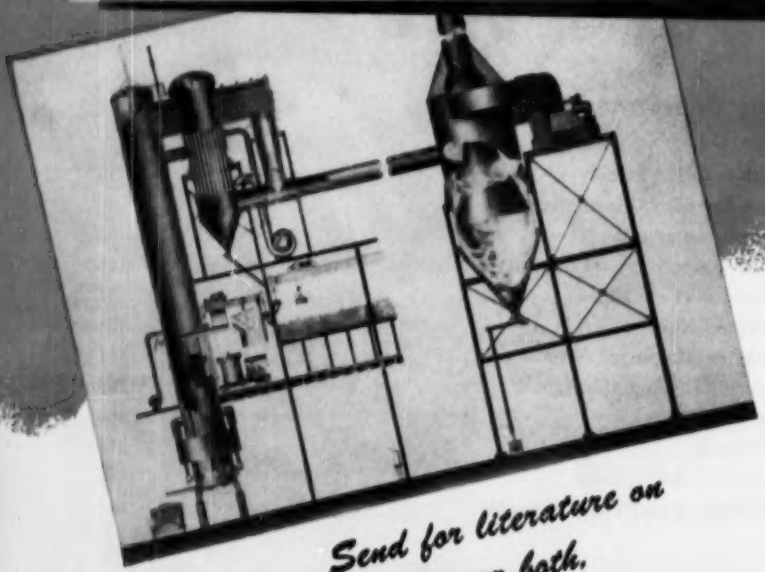
TODD-THERMO Hot Blast Heater, utilizing gas or oil for fuel, employs a floating type exchanger section, composed of two or more banks of "U" or hairpin staggered tubes. Front bank of tubes, at which point the severe (highest) inlet temperature is encountered, is made of especially selected alloy metals.

Compactness and Efficiency

are reflected in TODD-THERMO Hot Blast Heaters which, in a few minutes, will heat pure uncontaminated air, of any foundry required volume, up to 1000° F., at small operational cost, with practically no maintenance.



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Tips, Trends & Techniques

New Tools for the Castings Industry.....p. 14

Year after year, the companies that supply the foundry industry with the tools for castings production come up with new equipment and supplies, and improvements on existing, accepted materials and machines, that enable the foundryman to do a better, faster, lower-cost job. New tools that have become available since the 1954 AFS Convention, as reported by the manufacturers themselves, are pictured and described in 13 pages starting on page 14.

Foundry Technology, Today and Tomorrow...p. 60

What foundrymen are doing in castings production in North America and abroad, and new processes they will be using increasingly in the future, will be detailed in 65 sessions featuring more than 150 speakers and discussion leaders during the 1955 AFS Convention in Houston.

Foundryman of the Year.....p. 64

Honored each year for their contributions to the castings industry in its many phases of production, management, research, and education are several men selected by the AFS Board of Awards. Presentations are made at the Annual Banquet during the AFS Convention.

Castings Production Tools at Work.....p. 82

To see what foundrymen are doing with equipment and materials available to them, Conventioneers visit plants in the vicinity of an AFS Annual Meeting. This year many Houston-area foundries as well as Texas foundries on all routes to the convention city are open to visitors. Names, locations, what to see and when you can see it, are given for Houston plants. Map shows name and location of all Texas foundries and highways they're located on.

What's New in Light Iron Castings.....p. 89

Die Pressing Process for gutters and other castings produces low-cost, gray-as-cast iron in mechanized permanent molds. It's an outgrowth of post-war castings demands and manpower shortages reported in this year's official exchange paper from the Institute of British Foundrymen to the 1955 AFS Convention.

Non-Destructive Testing Know-How.....p. 96

How a steel foundry uses radiographic and magnetic particle techniques to develop foundry practice that assures sound, homogeneous castings. Foundries can establish own rating systems for soundness using method described.

Core Box Blow-By Eliminated.....p. 101

Simple, dike-type seal prevents even old, worn blow boxes from blowing externally or internally. Eliminated are: safety hazard due to flying sand . . . costly mudding and patching . . . high closing pressures . . . damage at mating faces of core boxes . . . costly brass and steel facing . . . production stoppages.

Controlling Foundry Noise.....p. 104

Present knowledge of industrial noise—if used and properly applied—will go a long way toward protection of workers exposed to excessive noise. Industrial noise can be measured and sufficient data are available to classify noisy operations into "excessive," "borderline," and "safe" categories.

Pilot Plant Castings Production.....p. 110

Following trend toward establishment of research and development facilities, the world's largest producer—as well as consumer—of ferrous castings has set up an experimental foundry to conduct both fundamental and manufacturing research. Larger than some commercial foundries, the plant permits casting on a simulated production scale of any ferrous casting up to 8-cylinder engine block size, while castings up to two tons can be made on a jobbing basis.

Are Designers Light-Headed Visionaries?....p. 118

Like production of castings, designing them is not an exact science. Personal opinion and experience play a big part in both. Contrary to the opinion of some foundrymen, designers have real reasons for the designs they create and every part in a machine or structure is weighed in the light of the question: Is there a less expensive, satisfactory way to make it?

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BAKER PERKINS SIZE 14

BATCH TYPE UNIDOR CORE AND MOLDING SAND MIXER FOR JOB FOUNDRIES

BAKER PERKINS Unidor Core and Molding Sand Mixers help speed up sand mixing operations and improve the quality of core and mold sand mixes so that you can produce good, clean castings that require less shakeout and machining time. These mixers rub, stir and knead in one operation without special aerating attachments. Gentle and thorough mixing action coats each grain of sand evenly with a thin layer of bond without breaking up the delicate silica grains. The mixed sand has a high degree of permeability, is homogeneous and does not require riddling.

BAKER PERKINS Unidor Sand Mixers are strong and well constructed with a simplified operating mechanism that helps keep maintenance and operating costs low. The No. 14 Mixer shown here has a fabricated steel trough shell and cast iron ends, renewable steel liners, and cast steel Sigma blades with renewable wearing shoes of hardened steel. It has a working capacity of 5.5 cu. ft. BAKER PERKINS Unidor Mixers are available for job foundries in capacities up to 35 cu. ft. These models can be adapted to or equipped with air or electrically operated skip hoists. A laboratory model with a working capacity of 1500 to 2000 grams is also available. For complete information, consult a BAKER PERKINS sales engineer or write us today.

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CHEMICAL MACHINERY DIVISION

SAGINAW, MICHIGAN

276

WESTINGHOUSE • PRIER BRASS MFG. CO. • READING GRAY IRON CASTINGS, INC.
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Two Good Reasons Why These and Many Other Famous Foundries have switched to

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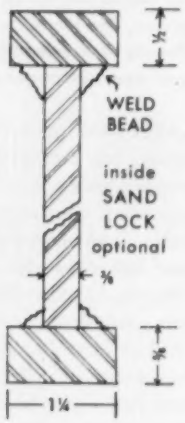
BS&B Foundry Flasks are designed by men with actual foundry experience. They know from experience the features you want! From their designs, BS&B's skilled workmen can turn out a flask tailor made for you. Your BS&B Flask will have the greatest rigidity, with minimum weight for easy handling. BS&B Flasks are constructed entirely of steel . . . all parts joined together with electric arc welding . . . sections are surface ground or machined, top and bottom, to insure a tight joint at the parting line . . . pinholes fitted with removable hardened steel bushings—round and oblong. Pinlug arrangements to your individual requirements.

2 The way they stand up

Pennies make you dollars where BS&B Foundry Flasks are concerned. Maybe you do pay a little more for BS&B Flasks . . . but you get dollars of extra value. BS&B Flasks require a minimum of maintenance year in and year out. They stand up—turn out better casings, keep scrap down. Actually, BS&B customers report six-eight-ten even twelve years of operation—without maintenance expense! Here's proof BS&B Foundry Flasks are built to stand continued use under hard working conditions and vigorous shake out. Cost records maintained by many foundries prove BS&B Foundry Flasks withstand more castings per flask throughout their service life.

Have a really tough, heavy casting job to do? Then put this one into service

BS&B Heavy Duty Flask Style FP 22



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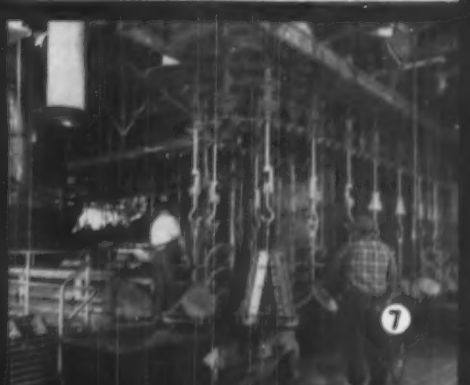

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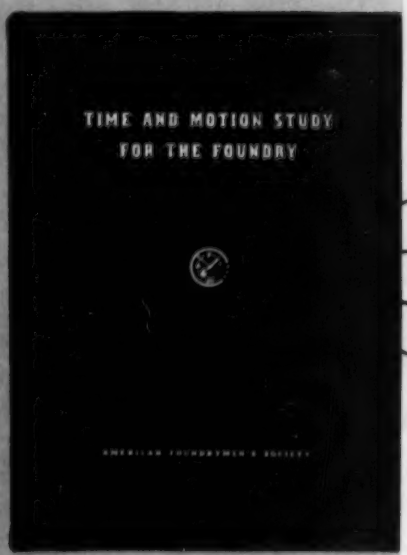
Actually, this book is a symposium of carefully selected articles that provide practical foundrymen with the "shortest route" to . . .



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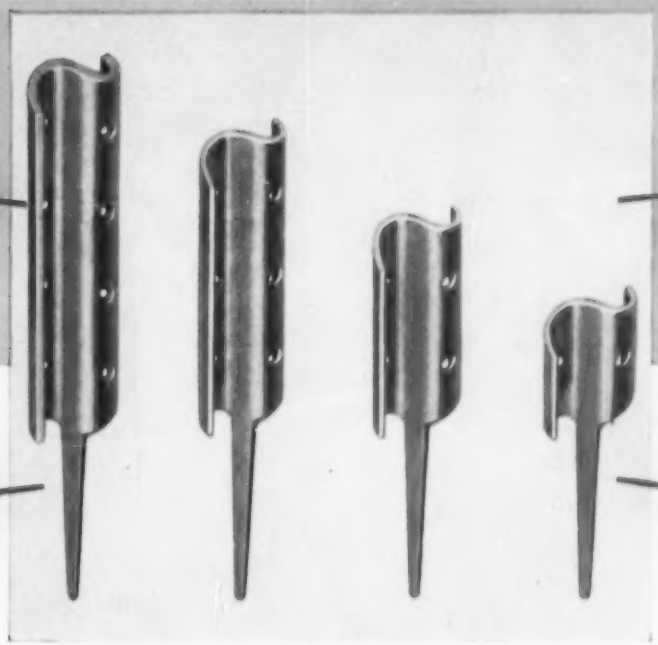

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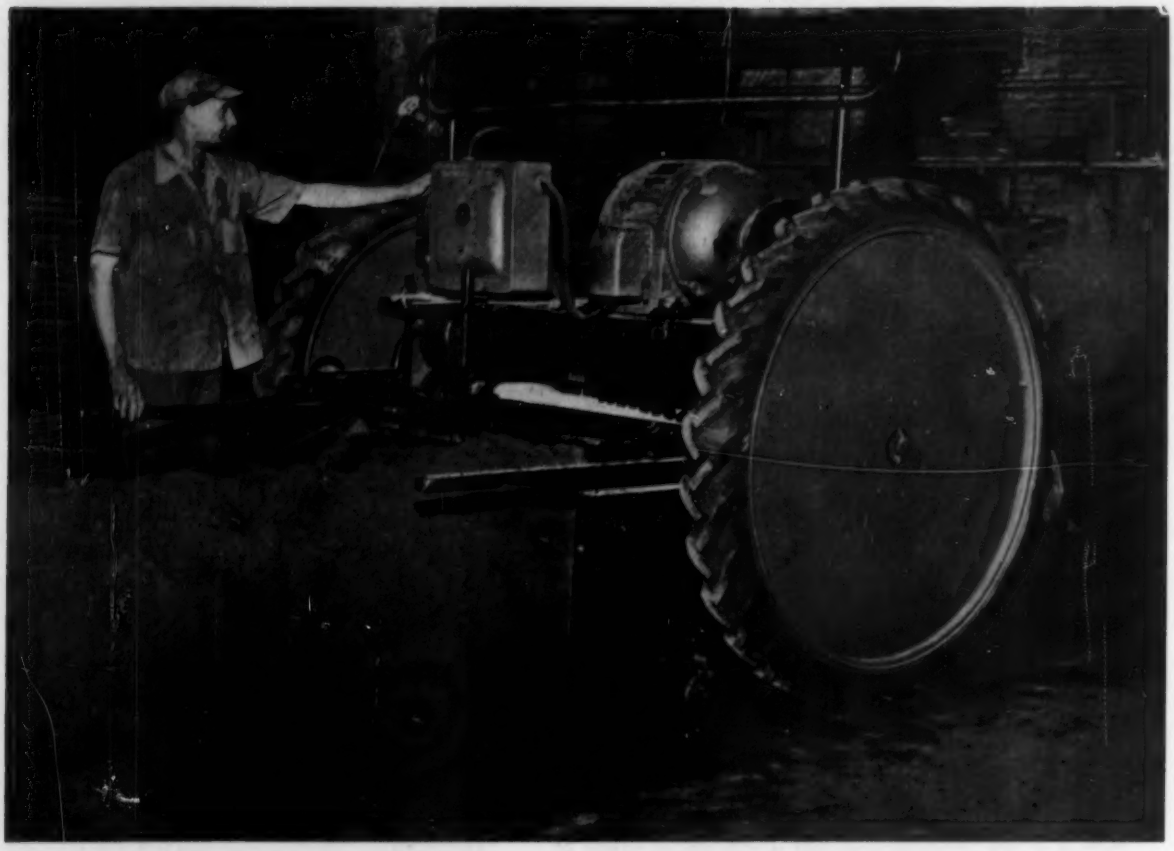

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Here are some of the New Tools of the Castings industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.

NEW TOOLS

▲ Shell Molding System

A fully integrated shell molding system designed to advance the foundry industry one step closer to the automatic foundry is now available. In this new system all process equipment from sand preparation to handling of finished castings are offered. The heart of the compact shell molding system is shown above. The four-station shell molding machine and push-button control station are at the right. Core setting conveyor and shell closing machine are in the center and mechanized shell storage conveyor is at the left. Fully described in 8-page Book No. 2462. *Link-Belt Co.*

For more facts, circle No. 196 on p. 47

▲ Pyro Surface Pyrometer

New Pyro Surface Pyrometer, of importance to the foundryman employing the shell molding process, for the close control of operating temperatures, is now available. Portable instrument features a direct reading scale of 4¾-in. indicator. Unit is constructed in a dust, moisture, and shock-resistant shielded steel housing which makes it not only rugged and durable, but also immune to external electrical influences. Exclusive Pyro Lock-Swivel on the extension arms permits the thermocouple to be locked in any position or angle. *Pyrometer Instrument Co.*

For more facts, circle No. 197 on p. 47

▼ Safety Shoes

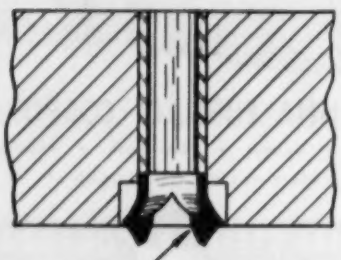
The latest in a long line of Iron Age foundry safety shoes is now available. It is made with a Neoprene sole and a full leather middle sole that gives the wearer cooler foot comfort, where heat is a problem. The shoe, style 646, has a leather lining under the steel cap for longer wear. It is available in both D and E widths. Further information pertaining to this and other style safety shoes, may be obtained by writing *Iron Age Div., H. Childs & Co., Inc.*, 1205 Madison Avenue, Pittsburgh 12, Pa.

For more facts, circle No. 198 on p. 47

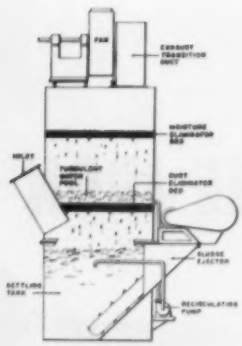
▼ Sand Arrester Blow Tube

Latest addition to manufacturer's line of blow tubes is new valve-tip Sand Arrester Tube. Valve readily passes sand from core blower magazine to core box at blowing pressure, but prevents fully flowable, even dry, sands from running out of blow holes on box change or shuttle cycles. Available in same sizes and lengths as regular Sand Arrester Tubes making conversion to valve-tip arrester tubes easy. *Martin Engineering Co.*

For more facts, circle No. 199 on p. 47



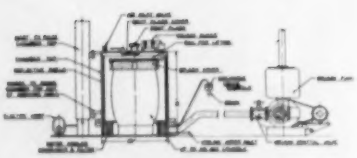
VALVE TUBE DURING BLOW



▲ High-Efficiency Dust Collector

Hydro-Filter uses unique system to insure intimate contact and thorough wetting of air contaminants to clean air. Counter-current principle gives efficient cleaning effect. Small flow of fresh make-up water plus recirculated water from sludge tank is continuously added to pool above filter bed. Particulate matter settles in sludge basin and is removed by chain flight conveyor. Particles too fine or too light to settle are continuously drained from overflow. Described in Bulletin 514. *National Dust Collector Corp.*

For more facts, circle No. 200 on p. 47



▲ Vacuum Degassing Equipment

Vacuum degassing equipment for use with ladles or crucibles enables foundrymen to use existing melting units, then degass to achieve higher quality metal with improved mechanical properties. Six sizes of degassing ladles have capacity from 150 to 1000 lb of bronze. Model 400 degassing chamber takes crucibles up to No. 400. Both units, complete with vacuum pump, motor, controls, valves, gauges, can maintain 10 micron vacuum. Degassing starts in 30 seconds, takes only few minutes depending on alloy being treated. *Centrifugal Casting Machine Co.*

For more facts, circle No. 201 on p. 47

for the Castings Industry

▲ Portable Vacuum Cleaner

Hoffco-Vac No. 75 is a super-duty industrial portable vacuum cleaning unit that can be operated with two 1½-in. hoses simultaneously or one 2-in. hose; either with hose lengths up to 100 ft. Specifically designed for handling large dust accumulations, for continuous cleaning, or where superior separation is required to prevent exhausting harmful dusts back into the room atmosphere. Ideal for foundries; capable of handling dusts weighing up to 250 lb per cu. ft. Bulletin No. A889. *U. S. Hoffman Machinery Corp.*

For more facts, circle No. 202 on p. 47

▲ Pneumatic Sand Transport

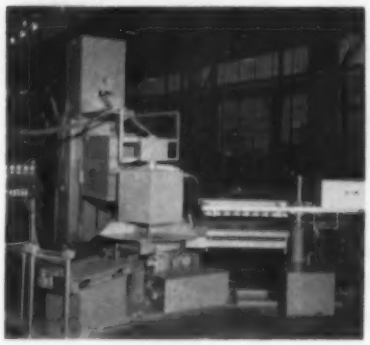
One-man push-button control of sand distribution system enables molding or core sand of desired composition to be delivered by batch where needed. Air enters transporter tangentially from manifolds causing sand to spiral upwards and into pipe line. Transfer switches give distribution flexibility. Booster fittings at strategic locations compensate for air loss, maintain fluidity of sand mixture which is delivered with little or no loss of moisture. Sand receivers designed to absorb shock and wear. *Whirl-Air-Flow Corp.*

For more facts, circle No. 203 on p. 47

▼ Automatic Shell Machine

The Formatic automatic shell mold making machine containing many exclusive features essential for successful shell mold making is now available. One feature is the unit package construction. Each functional unit—inversion investment unit, curing furnace and stripper—is a self-contained package. This provides for a wide variety of machine combinations to suit any particular production condition or requirements. Shown below is a single-pattern machine with the functional units arranged in a circle and an automatic rotary index unit carrying the pattern from one station to another. *Beardsley & Piper Div., Pettibone-Mulliken Corp.*

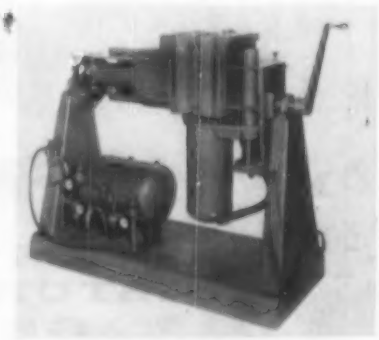
For more facts, circle No. 204 on p. 47



▼ Blast Barrel

Blastmaster line has been extended to give foundrymen choice from 1½ (see picture) to 27-cu ft capacity shown in Bulletin No. 225. Improved work loader increases efficiency; ample space between loader and cleaning unit for track, wheeled car, conveyor or belt, or tote box for receiving clean castings. Construction features include abrasive-tight door protected from blast by heavy rubber curtain, extensive use of roller bearings, heavy, easily-removed wear plates on drum ends, and automatic overload torque throw-out. *Pangborn Corp.*

For more facts, circle No. 205 on p. 47



▲ Shell Core Blower

Shalco Model MC-5 Shell Core Blower is designed for the production of hollow shell cores using metal core boxes up to 9 x 12 x 20-in. Provisions are made for the installation of larger core boxes up to 30 in. in length. Machine produces one complete core, fully cured, every 30-50 seconds. Electrically heated plates provide heat to the core box halves, which are opened and closed pneumatically. Sand-resin mix is blown into the core box through a pneumatically controlled core blow head in which the mix is retained. *Shallway International Corp.*

For more facts, circle No. 206 on p. 47

▲ Water Fire Extinguisher

The first Underwriters' Approved pressurized water-type fire extinguisher, Elk-Air, has just been announced. This is the first extinguisher of its type using only air-pressure rather than a cartridge charge. Important money savings are offered because no Soda-Acid recharge or CO_2 cartridge replacement cost is necessary. Then too, no annual inspection costs. On-the-spot recharging is done by merely replacing the water and pressurizing by air the same as an automobile tire. Pressure gauge indicates if extinguisher is ready for action. *Elkhart Brass Mfg. Co., Inc.*

For more facts, circle No. 207 on p. 47

continued on page 22

Paraspray, the modern surface conditioner, dries hard within seconds to a tough, moistureproof finish. It instantly creates a deoxidized atmosphere, stops "burn-ins" with a thin carbon film formed between sand and metal. Moisture content is effectively stabilized (no gain, no loss), enabling the safe storage of molds for days before pouring. The result—costly rejects from gas holes or porosity are practically eliminated.

PARASPRAY PRODUCES CLEANER CASTINGS ... REDUCES LABOR COST!

Gentlemen: Please rush additional information and price lists concerning Paraspray and other fine Para-Products.

COMPANY_____

ADDRESS_____

Dept. C-1

Para PRODUCTS
5200 River Road, Bethesda, Md.

FOUNDRY RUBBER, INCORPORATED

For more facts, circle No. 425 on postage-free Reader Service card on p. 47 or 48

Letters

Letters should be addressed to *American Foundryman*, Golf & Wolf Roads, Des Plaines, Ill. Letters must be signed but will be published without signature on request.

Foundryman's Holiday

I have visited the Pearl Harbor Naval Shipyard where they have a very excellent, large jobbing foundry, well equipped for iron or steel, designed along the lines of the No. 4 shop at Muskegon. Also the Honolulu Iron Works which is a very old factory making sugar refinery machinery castings. And there's always one little 50 x 100 jobbing shop. At present none of them are busy, a few men working in each. Of course, this doesn't say anything about the places of pleasure, that Mrs. Cannon and I visited and enjoyed very much.

GEORGE W. CANNON, SR.
Honolulu, Hawaii

Something for Every Foundryman

We are most impressed with the AFS publication THE CUPOLA AND ITS OPERATION, quite the most helpful work on the subject we have encountered. We are wondering if this is the only book of its type that you have produced, or whether there are similar publications on sand, molding technique, metallurgy, etc. If this is the case, will you please send us particulars of these books.

J. H. DOYLE
Faversham, Kent, England

More than 50 publications on all phases of castings production and utilization are shown on the enclosed list. These are products of the technical committees of the American Foundrymen's Society whose members carry on a vigorous program, developing literature to meet the casting industry's needs. New and revised publications are issued at the rate of about eight a year. Recent new titles include TIME AND MOTION STUDY FOR THE INDUSTRY, PROCESSING MOLDING SAND *a summary of melting principles for brass and bronze, and* CONTROL OF EMISSIONS FROM METAL MELTING OPERATIONS. *Coming up is an authoritative dust control and ventilation manual entitled* ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT FOR FOUNDRIES, *a manual for use in in-plant training courses, and a book on foundry principles suitable for use as an engineering college text.*—EDITOR.

Tear Sheets Gladly Sent

If possible we would like very much to secure three reprints of the article *"Casting Steel Pots"* by T. R. Stanley, which appeared in the February 1955 issue of AMERICAN FOUNDRYMAN, pages 42-46.

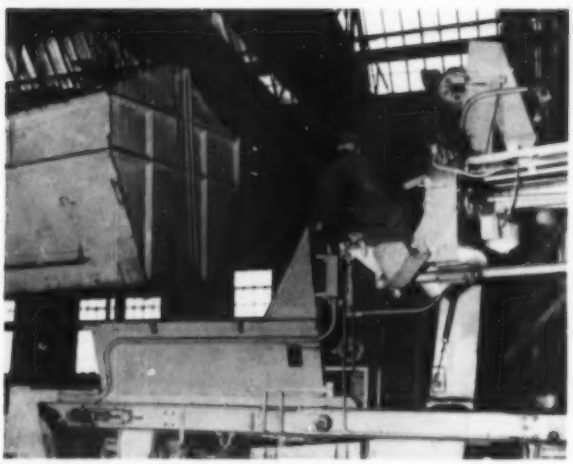
W. J. JENNI, *Prod. Mgr.*
Morris P. Kirk & Son, Inc.
Los Angeles, California

continued on page 21

A 1955
PREVIEW OF
1956
FOUNDRY
MACHINERY
FOR ALL FOUNDRIES
LARGE AND SMALL

SLINGER ROTO-MOLD AND HYDRA-SLINGER ROTO-MOLD UNITS give the jobbing foundry all of the advantages of production operation . . . with top flexibility and at a cost well below that of other installations offering similar productivity. Inherently low man-hour requirement offers the jobbing foundry great advantage.

Each year look to
BEARDSLEY & PIPER
for better methods



RECENT IMPROVEMENTS make the Motive Slingers–the Motive Sandslinger and Speedslinger—the best possible investments for foundries ramming a wide range of medium and large work. Recent improvements give the "motives" even greater advantage in jobbing operations. Range of size and operation is unlimited.

. . . IN MOLDING MACHINERY

THE NEW B&P JOLT SQUEEZER with 6-inch jolt cylinder and 16-inch squeeze cylinder is of swinghead design. Dual safety squeeze controls and knee valve jolt control make this machine extremely fast and safe. Table size is 20 x 26 inches, and the vertical opening between table and squeeze head is 20 inches. The capacity of this fast new squeezer is 940 lbs.

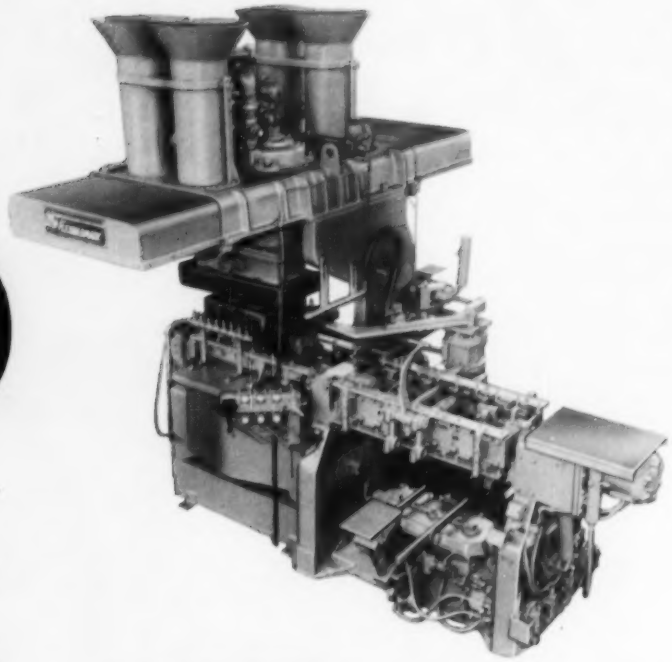
THE NEW B&P ROL-A-DRAW offering capacities to 10,000 lbs. is for use in coremaking or molding units with Slinger, Roto-Mold, or conveyor installations. It features automatic flask equalization and clamping, automatic single control, rollover cycle, all-hydraulic controls and minimum pit requirement. Flasks or core boxes up to 60" width—76" depth and length unlimited.

Each year look to

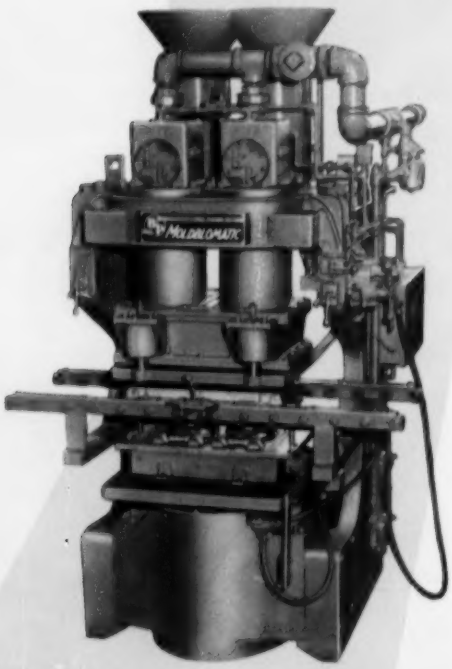
BEARDSLEY & PIPER

for better methods

. . . IN MOLD AND CORE BLOWERS



THE B&P FLEXIBLOMATIC coreblower is all new, all-pneumatic, and all-automatic. It's simple to operate and easy to service since there are no troublesome electrical contacts or relays. So efficient is the new Flexiblomatic, that this new unit blows, rolls over, and draws **240 cores per hour.** Indexing of the box, blowing, rollover, drawing, ejection, and delivery of the core are all automatic.



THE NEW B&P MOLDBLOMATIC blows and squeezes copes or drags in a single fully controlled cycle. More than ever before, the name Beardsley & Piper means leadership in the mold and core blowing field. Uniformity, accuracy and speed are characteristics of this new process. Capacity . . . up to two complete molds per minute. Flask size . . . up to 18 x 26 inches.

THE NEW FLEXIBLO CB5-CD COREBLOWER leads the field in small coreblowers. Its precision 2" draw is an invaluable feature for the core room. New also is the error-proof single push-button sequence control. One small button controls every operation in the blowing sequence. Look for new standards of performance from this B&P Flexiblo. Capacity—cores up to 4½ lbs. in weight.

. . . IN MOLDING AND CORE SAND PREPARATION MACHINERY

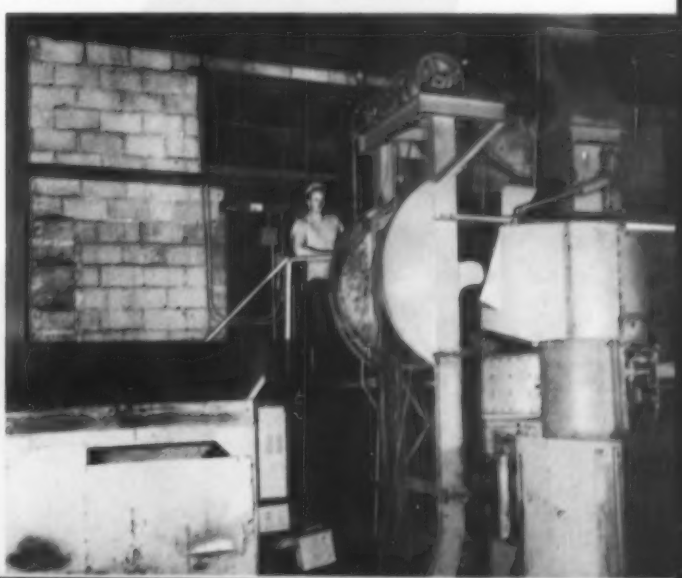
EVERY FLOOR SAND CONDITIONING REQUIREMENT is met by one of B&P's complete line of floor sand conditioning machines. The Junior Nite Gang shown here features complete lump breaking, magnetic separation, aeration, and screening. The same high standard of sand conditioning is featured in the self-propelling and self-loading Nite Gang. Capacities to 40 tons per hour.

CONTROL OF MULLING OPERATIONS becomes more and more vital as labor and material costs rise. For Mulbaros and Speedmullors, Mulltrol—which controls the overall mulling cycle is the minimum recommended control. For all of those foundries which must obtain fullest uniformity and control, Mulltrolmatic offers the ultimate in automatic operation.

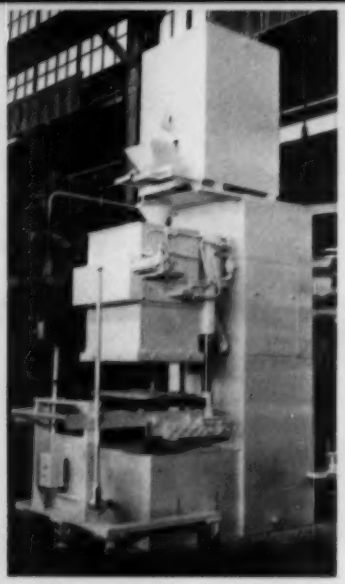
FOR LOW COST CONDITIONING the three models of Screenarator —S, M and L—just can't be duplicated. Recent improvements have lengthened service life and reduced maintenance. Capacities of 750, 1000, and 1500 lbs. per minute. The lowest cost and easiest to operate complete screening and aerating device that can be installed.

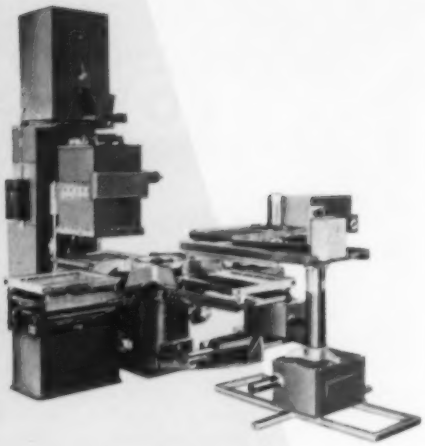
THE MULBARO AND LAB MULBARO offer the same high standard of mulling as the production Speedmullors. The Mulbaro gains highest capacity of any portable mullor by using a single mulling mechanism with several mulling bowls. Capacity is doubled or tripled at little added cost. The Lab Mulbaro also features interchangeable mulling bowls for best laboratory control.

THE NEW "A" SERIES SPEEDMULLORS have important new advantages that extend their margin of performance superiority. Hourly outputs of completely mulled sands are **increased 20 to 33%** in every model. Speedmullor-Preparator Units with the new **all above-floor Preparators** offer the jobbing foundry convenience, control, and quality never before available.



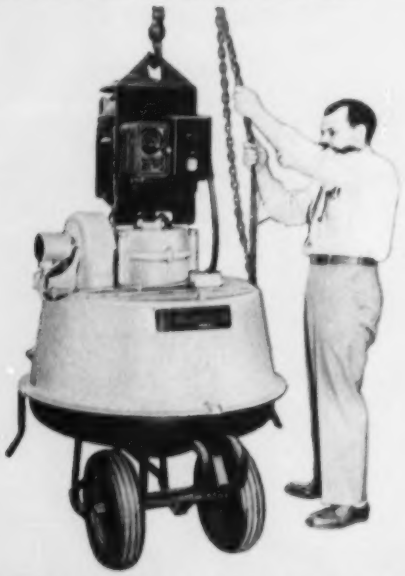
. . . IN SHELL MOLDING

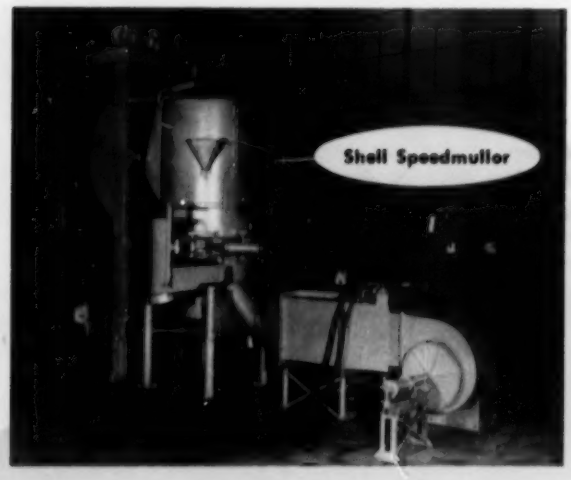




B&P UNIT-PACKAGE DESIGN means real savings for the foundry entering the shell molding field. Now, the progressive foundry can start—at minimum investment—with those units that are essential to its early program . . . investment unit or blower, furnace, and draw station. Later, these same packages can be combined at a small additional investment into a complete Rotary Formatic Unit.

SHELL BLOWING too, with the new B&P Biomatic Shell machine, can be included in a foundry's plans at minimum cost. Proved shell blower and shell curing furnace design are combined in the new Shell Biomatic. A Biomatic Shell machine may be used individually or made a part of a complete rotary unit.





SHELL SAND PREPARATION is accomplished at minimum initial and operational cost in the new Shell Mulbaro. Designed to provide the exact cold preparation needed for either the "C" or "D" processes, the Shell Mulbaro is ideal for the small foundry. For higher capacity requirements for either hot or cold preparation, the **Shell Speedmuller** is manufactured in sizes to meet any requirement, and is the only mulling unit that offers efficient preparation of shell sands by the hot process. The standard **Speedmuller** is used extensively for high capacity cold preparation of shell sands.

Manufacturers of Sandslingers, Speedslingers, Hydra-Slingers, Swingslingers, Speedmullers, Speedmuller-Preparator Units, Mulbaros, Lab Mulbaros, Roto-Mold Turntables, Roto-Feed Plate Feeders, Screenarators, Magnarators, Junior Nite Gangs, Nite Gangs, Portable Preparators, Flexible and Flexible-matic Coreblowers and Moldblowers, CR and TR Cormatic Units, B&P Rol-A-Draw, and Jolt Rol-A-Draw Machines. Shell Mulbaros, Shell Speedmullers, Formatic and Biomatic Shell Molding Units, Champion Molding Machines, J&J Molding Machines and a complete line of automatic control equipment including Biomatic, Multirol and Multirolmatic.

Each year look to

BEARDSLEY & PIPER

for better methods

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Letters

continued from page 16

It has come to our attention that there is an article entitled *"Cupola Gas Scrubbers"* by O. J. Brechtelsbauer, pages 34-37 of the February 1955 issue of AMERICAN FOUNDRYMAN. Please furnish us one copy of this article.

G. W. BODEN, *Dist. Pur. Agent*
Bethlehem Steel Co.
Sparrows Point, Maryland

In the September 1954 issue of AMERICAN FOUNDRYMAN, on pages 56-58 the following article appears: *"Revised Spiral Test Relates Fluidity to Phase Diagram"* by W. A. Spindler, W. B. Pierce and R. A. Flinn. We require an additional copy of this article, and we should be very grateful if you could let us have a reprint.

R. MERCERE, *Manager*
Enfield Rolling Mills Ltd.
Bradford, England

I would appreciate receiving two tear sheets of the article *"Cooling Castings After Shakeout"* written by T. J. Glaza. This was published on pages 46-47, AMERICAN FOUNDRYMAN, January 1955. We thank you for your kind attention to this matter.

G. L. NOVY, *Asst. Works Mgr.*
Canada Iron Foundries, Ltd.
Trois Rivieres, Canada

I would appreciate it very much if you would kindly send me a reprint of the article which appeared in AMERICAN FOUNDRYMAN, January 1955, pages 50-56 entitled *"Melting and Pouring Bronze"* by A. E. Cartwright.

ALBERT M. WITKOWSKY, *Chief Chemist*
New Progress Metals, Inc.
Newark, New Jersey

We would appreciate three tear sheet copies of the following articles: *"Mechanized Shell Molding"* by F. E. Murphy pages 42-45, January 1955 issue; *"Developments in Shell Molding"* by E. I. Valyi, pages 138-143, May 1954 issue.

A. S. GROT, *Plant Met.*
Edward Valves, Inc.
East Chicago, Ind.

I would appreciate your sending me two tear sheets of *"Vacuum Test Shows Up Gassy Metal"* by W. D. Walther, C. M. Adams, Jr., and H. F. Taylor, March 1955 issue, pages 62-65.

R. A. KOZLIK, *Met.*
International Nickel Co., Inc.
Bayonne, New Jersey

May we have two sets of tear sheets of the article *"Sight Savers"* that appeared on pages 56-59 of your March 1955 issue. They are very dramatic in showing safety practices. Good work!

J. J. PHILLIPS, *Librarian*
Haynes Stellite Co.
Kokomo, Indiana

1954

CHARLES EDGAR HOYT

Annual Lecture

"PROCESSING MOLDING SANDS"

By Harry W. Dietert

a comprehensive review covering:

- base materials
- blending
- additives
- cooling
- mixing
- tempering
- aerating
- ramming
- shake-out

The author discusses in detail how materials are processed to obtain molding sands that possess desirable properties to produce castings of high quality. The practice and theory behind blending is covered in detail. Data are presented on the various additives.

Bonding materials information is included as a guide to their proper choice and use. Various methods of mixing sands are reviewed. Recent developments concerning tempering sand by weight-moisture, deformation-moisture, conductivity-moisture, capacitance-moisture, and temperature-moisture relations are shown in detail.

Methods of aerating sand are described. The subject of reclaiming sands is covered by showing schematic diagrams of various processes.

32 pages 8½ x 11 paper-bound 63 illustrations
Members $1.50 Others $2.25

AMERICAN FOUNDRYMEN'S SOCIETY
Gold & Wolf Roads
Des Plaines, Ill.

Please send me_____copies of PROCESSING MOLDING SANDS
I enclose $_____cash____money order____check____to cover.
Please send invoice._____
Name_____
Company_____
Address_____
City_____P. O. Zone____State____

(AFS pays postage when remittance accompanies order)

NEW TOOLS

continued from page 15

Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.

▲ Pre-Mixed Grout and Mortar

Embeco, used where non-shrink mortar or grouting is required, is now available as Embeco Pre-Mixed Grout and Embeco Pre-Mixed Mortar. User merely adds water according to instructions in folder available. Grout used for grouting machinery, anchor bolts, building columns, etc. Mortar good for patching concrete floors and steps, tuck pointing masonry, caulking floor slabs and the like. Materials do not shrink like plain sand-cement mixes, have higher mechanical properties, lower oil and water absorption. *Master Builders Co.*

For more facts, circle No. 208 on p. 47

▲ Small, Mobile Power Shovel

Y-20 Bulk Loader has capacity of 11 cu ft or about 1200 lb. Powered by gasoline engine, shovel has outside turning radius of only 73 in., making for convenience in small spaces and boxcar unloading. Other dimensions: length, 109 in.; width, 46½ in.; overall height, 60 in.; weight, 4400 lb. Drive tires in front are pneumatic; rear steer tires are cushion type. Fully loaded shovel climbs 14 per cent grade. Bucket can be carried without spillage in completely lowered position. *Clark Equipment Co.*

For more facts, circle No. 209 on p. 47

▼ Stack Molding Machine

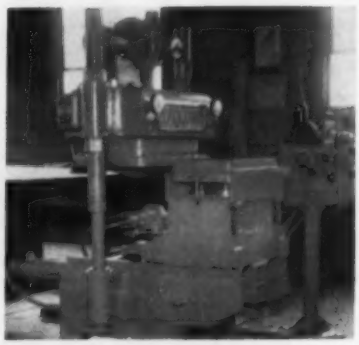
New Tabor jar-squeeze, flask-lift stack molding machine has adjustable head which accommodates pattern plates for flasks 12, 13, and 14 in. wide by 20 in. long. Jarring operations are controlled by timing device. Yoke is power operated. During squeeze, the trunnion-type head is securely locked in place with squeeze unit to insure positive match. *Tabor Mfg. Co.*

For more facts, circle No. 210 on p. 47

▼ Airline Respirator

The M.S.A. Dustfoe Airline Respirator, a light-weight, supplied-air type respiratory protective piece using a compact, formable aluminum facepiece, has been introduced. The formable aluminum facepiece is light in weight and compact to wear—offers minimum interference to the wearer. A streamlined nylon fitting at the bottom of the facepiece serves as a connector for the flexible corrugated air supply hose. Dual exhalation valves offer minimum breathing resistance. An air diffuser prevents air blasts on the face. *Mine Safety Appliances Co.*

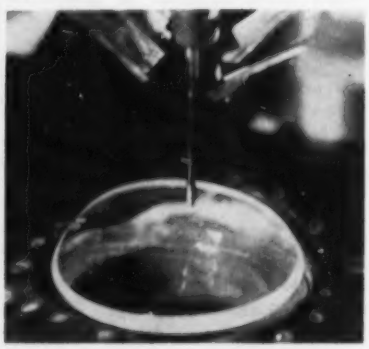
For more facts, circle No. 211 on p. 47



▲ Diaphragm Molding Machine

Taccone Diaform pneumatic molding machine line has several new models; smallest is the 12 x 18-in. illustrated. Adapted to numerous sizes and shapes of castings, the machines pack the sand by air pressure applied to a rubber diaphragm. Strip by bar lift, pin lift, or roller rail lift. Control panel separate from machine, gives versatility, eliminates special foundations. Two-speed lift attachment for all Taccone machines makes rate and distance of lift completely adjustable. *Eastern Clay Products.*

For more facts, circle No. 212 on p. 47



▲ Safety Spectacle Lens

In a test, developed by the makers of the new Optilite lens (a lightweight safety lens material of compounded resins), a pencil-shaped bar weighing 44 gm is used, with a sharp steel Singer sewing machine needle inserted in the end. In the test, the weighted needle-pointed bar is dropped a distance of 87 in. in a tube, by trigger control, onto the apex of the lens at the rate of 6.5 mile a second. In a series of tests, with the full force of the needle-pointed weight dropped 87 in. onto the very center of the Optilite lens, no specimens (see picture) were fractured. *United States Safety Service Co.*

For more facts, circle No. 213 on p. 47

continued on page 26

ANNOUNCING...Book 2462 on the new LINK-BELT Shell Molding System

See how you can achieve HIGH-VOLUME PRODUCTION of precision castings requiring little or no machining

Here in eight thoroughly-illustrated pages is the announcement story of industry's most compact and efficient shell molding system. Book 2462 gives you a step-by-step picture of sand handling, molding and closing operations. It also demonstrates the outstanding advantages offered you by Link-Belt — the only source for a complete system. Use the coupon below.

- ★ Advantages of shell molding
- ★ Exclusive benefits of Link-Belt's system
- ★ Link-Belt's advanced Shell Molding Machine
- ★ The Link-Belt Closing Machine
- ★ Typical production layout
- ★ Specifications
- ★ Related Equipment

MAIL THIS COUPON NOW!

LINK-BELT COMPANY
307 N. Michigan Ave., Chicago 1, Illinois
(or your nearest Link-Belt office)

Please send me a copy of your new Book 2462 on the Link-Belt Automatic Shell Molding System.

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LINK-BELT

SHELL MOLDING SYSTEM

13.038

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

FEMA

For more facts, circle No. 427 on postage-free Reader Service card on p. 47 or 48

PRODUCES BETTER CORES! James B. Clow & Sons reports: Uniform electronic baking eliminates stresses and subsequent surface cracks or dimensional instability. Cores won't sag, don't require reinforcing rods. Surfaces are smoother and harder. Their cores range in size from ½ ounce to 400 pounds.

STREAMLINES FLOW! Boose Aluminum Foundry, Reamstown, Pennsylvania, has increased coreroom output 33% per manhour. Cores move continuously from maker through their two 15 kw THERMEX units in tandem. No storage required. Minimizes handling. Cores from ½ ounce to over 20 pounds can be baked simultaneously. Rejects are practically nil.

How to open the coreroom door to

LOWER COSTS

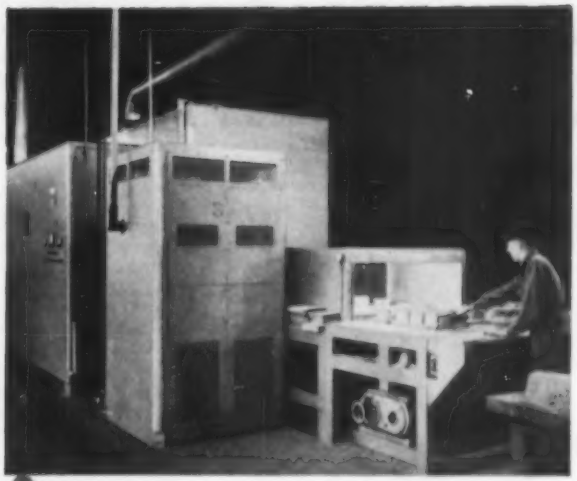
Modernize with Thermex® ELECTRONIC CORE BAKING EQUIPMENT

- CUTS BAKING TIME
- PRODUCES BETTER CORES
- STREAMLINES FLOW
- IMPROVES WORKING CONDITIONS
- REQUIRES FEWER DRIERS
- GIVES YOU FLEXIBILITY
- CUTS REJECTS

CUTS BAKING TIME! James B. Clow & Sons, Coshocton, Ohio, proved the advantages of THERMEX® Core Baking Apparatus with a 15 kw unit in the production of soil pipe fittings. Next they purchased two 60 kw units and one 75 kw unit. The resultant streamlined core production netted a reduction of 96% in baking time and 33% in coreroom manhours.

For more facts, circle No. 428 on postage-free Reader Service card on p. 47 or 48

REQUIRES FEWER DRIERS! At Repcal Brass Manufacturing Co., Los Angeles, a THERMEX Core Baking Unit enables one shift to produce more cores than two shifts with conventional baking equipment. Now, 35 driers produce 4500 cores continuously; formerly, 400 driers produced 1600 cores. Total estimated savings per year: $10,000.



IMPROVES WORKING CONDITIONS! At Frick Company, Waynesboro, Pennsylvania, a 60 kw THERMEX Core Baking Unit has replaced ovens. Working conditions have been greatly improved . . . no smoke or oven heat. Cores' quality has been improved. Production is faster, more flexible . . . used for about 20,000 different castings.

CUTS REJECTS! At United Foundries Co., Wyoming, Pennsylvania, a 15 kw THERMEX Core Baking Unit has been in operation more than 20,000 hours with only routine maintenance. Here, critical inspection formerly rejected 10% to 40% of all cores. Now 99% of the electronically-baked cores are perfect.

GIVES YOU FLEXIBILITY! New 75 kw THERMEX Electronic Core Baker has exclusive Tunnel Circuit for cores varying in height as much as five to one. This affords great flexibility for coreroom speed and economy. Continuous production with THERMEX units permits baking special runs at all times in a matter of minutes!

THERMEX DIVISION

The
GIRDLER
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My Position _____

NEW TOOLS

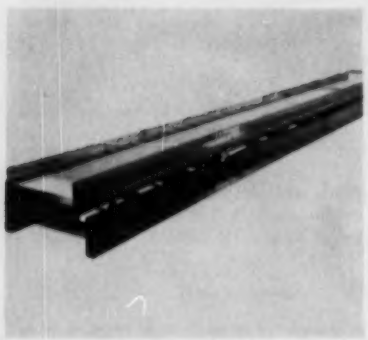
continued from page 22

Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.

▲ Baby Sand Rammer

New Model M-210 Baby Sand Rammer is less than 12 in. long, including rubber butt (standard) or other optional butt or peen. Light, fast, easy to handle, this little one is excellent for close corner work, can be operated with one hand. Weighs only 3½ lb. Use for molding or core making. Has air regulator for speed and power control. *Master Penumatic Tool Co., Inc.*

For more facts, circle No. 214 on p. 47



▲ Pan Type Conveyor

Model No. 32A Balanced Pan Type Conveyor has action counterbalanced by weights at end of rocker arms. Practically eliminates vibration in the main frame; unit requires only a minimum supporting structure. Rear drive allows more headroom, affords easy accessibility for maintenance. Unit shown has extra screen cloth deck. Baffles and discharges on bottom deck are arranged so sand is screened and distributed across large silo. Can be modified to distribute sand into different bins. With perforated plate instead of screen, conveyor handles small castings while conveying both castings and sand. *Simplicity Engineering Co.*

For more facts, circle No. 215 on p. 47

▼ Molded Lip Tilting Crucible

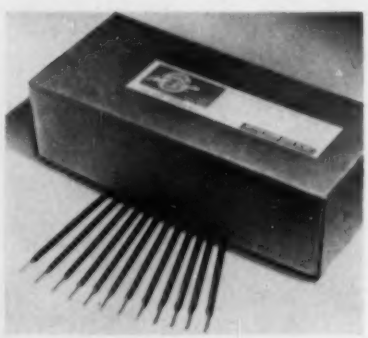
Tilting carbon-bonded crucible has lip molded as part of crucible body at time of manufacture. A one-piece tilting crucible without joint or seam, the lip is not fused or attached in a separate operation. Carbond Molded Lip Crucible is supplied in all popular sizes, is reported to have following advantages: no more leaky lips, no joint or seam to open in service; smooth inside contour eliminates splashing; sturdier lip construction withstands erosion of burner flame; longer crucible life; molded lip design gives greater capacity. *Joseph Dixon Crucible Co.*

For more facts, circle No. 216 on p. 47

▼ High Strength Electrode

No. 6 High Strength Cast Iron Electrode has been developed as a low-cost, non-machinable electrode primarily for repair and reclamation where finish may be ground or left as welded. Characterized by high strength (60,000 lb), the new electrode can be used with AC or DC welders to give dense, sound welds in all positions. Particularly designed for gears, motor housings, machine bases, cams, levers, farm machinery castings, it gives a good color match, has practically no scatter loss. Available in 5/32, 1/8, and 5/32 in. core sizes. Standard packages 50 lb. *All-State Welding Alloys Co., Inc.*

For more facts, circle No. 217 on p. 47



▲ Fuel Mixture Regulator

New Oil-Air Ratio Regulator has been developed for controlling oil burners by the varying of pressures to provide simple, automatic means of proportioning oil and air to industrial burners of the two-air connection type. Exhaustive tests show unit gives more accurate control and will hold required ratio over a greater range of capacity turn-down. Balanced design gives quicker response to pressure changes and eliminates need for auxiliary pressure regulator. Ideal for oil-fired melting, annealing and heat treating furnaces, ladle heating stations, and core ovens. Bulletin No. 722 available. *Hauck Mfg. Co.*

For more facts, circle No. 218 on p. 47

▲ Cutoff Machine

Type C10AF-X Tabor-Brasive Cutoff Machine is designed for heavy-duty cutting. Powered by 10 hp, fully-enclosed, fan-cooled motor, machine accommodates 16-in. diameter cutting wheels. Equipped with Tabor spindle that has Timken precision tapered bearings. Permanent tables built with T-slots for mounting vise or V-block. *Tabor Mfg. Co.*

For more facts, circle No. 219 on p. 47

continued on page 28

Designed especially for small job foundries and for experimental work, the new Gee Shell Mold Machine features simplicity, economy and ease of operation. Manufactured by the Metco Processing Corporation, Ypsilanti, Michigan, the Gee requires only air and gas service for complete installation. Shell molds and cores may be made separately or simultaneously from patterns up to 20" x 30" x 6".

Simplify Shell Molding with DOW CORNING 8 EMULSION

- **Assure Fast, Positive Release**
- **Keep Patterns Clean**
- **Nonflammable and Noncorrosive**
- **Dilutable in Hard or Soft Water**
- **Resists Creaming or Separating**

Shell molding becomes easier, more accurate, and more economical when you use Dow Corning 8 Emulsion. Especially designed for the shell process, this silicone parting agent gives you clean, easy release every time with little or no build-up on even the most complex patterns. Cleaning costs are minimized, and you obtain increased production of shells with uniform dimensional accuracy. For more information and a free trial sample, return the coupon today.

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DOW CORNING SILICONES **in the Foundry**

SILICONE PAINT GIVES LONG SERVICE ON METAL MELTING FURNACES AT 650 F

Expose a straight silicone paint to surface temperatures in the range of 650 F for 10 hours a day and it remains in excellent condition almost indefinitely. Under the same conditions, good, high temperature organic paints soon blister and peel, frequently within hours after application.

That has been the experience of maintenance men at the Saginaw Bearing Co. of Saginaw, Michigan, in testing various paints on their bronze-melting furnaces. Six months ago, after wire brushing a furnace to bare metal, they brushed on a single coat of straight silicone-aluminum paint. Cured in service, the coating is still in near-perfect condition. Compare its appearance in the photo foreground with that of the second furnace which was recoated with organic paints dozens of times during the past six months.

A complete list of formulators supplying silicone-based protective coatings is now available. For your free copy

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Gentlemen: Please send me

- ☐ Technical data on Dow Corning 8 Emulsion
- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ More information and sources of supply for silicone paints.

Name _____
Company _____
Street _____
City _____ Zone ___ State _____

For more facts, circle No. 429 on postage-free Reader Service card on p. 47 or 48

NEW TOOLS

continued from page 26

Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.

▲ Hand Grinder

New Master Power 622 wheel grinder takes 2-in. vitrified or 3-in. organic wheel, also mounted points, rotary files, and sanding drums. Governor-controlled for safety, it runs free at 12,000 rpm. Length is 13 1/16 in., weight 4 1/4 lb. Has sleeve-type throttle. Model 624 with same wheel capacity has lever-type throttle, is 3 1/4 in. shorter, 1/2 lb lighter. *Master Pneumatic Tool Co., Inc.*

For more facts, circle No. 220 on p. 47

▲ Car Shaker

Simplicity Car Shaker speeds unloading time for drop-bottom gondola cars. New unit cuts unloading from several man-hours as required manually to a few minutes work by one man. Weighing 9500 lb, shaker fits any size gondola. Motor is enclosed in unit, is rubber mounted to reduce motor vibration. Balanced for easy handling by overhead crane or hoist, shaker rapidly discharges granular materials even when they are frozen. *Simplicity Engineering Co.*

For more facts, circle No. 221 on p. 47

▼ Refractory Rammer

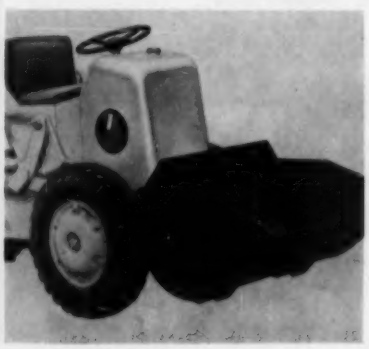
Model G-162D pneumatic rammer cuts down time for application and patching of refractories. Light and easy to handle, rammer delivers controlled, powerful, recoiless stroke. Severe vibration and kickback are eliminated. Twin rubber grip handles give better control and operation; rear grip can be rotated for better position of rammer and greater control. Operates at usual shop pressure. Quick-connect coupling permits easy connection to 1/4-in. air supply line. *Vibron Div., Burgess-Sterbents Corp.*

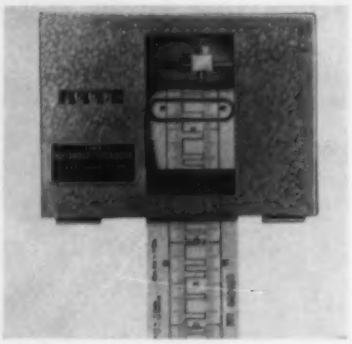
For more facts, circle No. 222 on p. 47

▼ Front-End Loader

Completely new HA model Payloader is smallest in the line, has 16 2/3 per cent larger bucket, with payload capacity of 18 cu ft and struck-load capacity of 14 cu ft. Maximum dumping height has been increased 18 per cent. More maneuverable, with shorter turning radius than former model, the new machine operates into and out of box cars with ease. New design carries heaped loads at lower level, providing greater stability and better operator vision. New standards of operator safety and ease of operation result from new bucket arm design. *Frank G. Hough Co.*

For more facts, circle No. 223 on p. 47

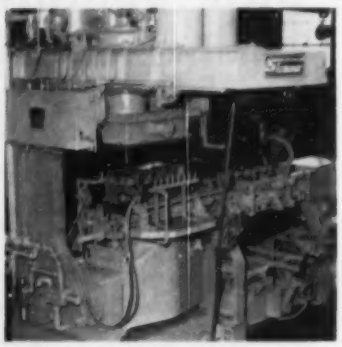




▲ Time Recorder and Totalizer

Time Recorder + Totalizer provides continuous operation record of any electrically operated machine or process. Chronologically marked tape continuously passes through instrument recording time and length of every "on," every "off" period of the equipment. Glance at tape gives information; totalizer gives complete "on" time of equipment. Install as integral part of equipment, as remote installation, or as portable tool. Tamperproof, easily installed. *Heat-Timer Corp.*

For more facts, circle No. 224 on p. 47

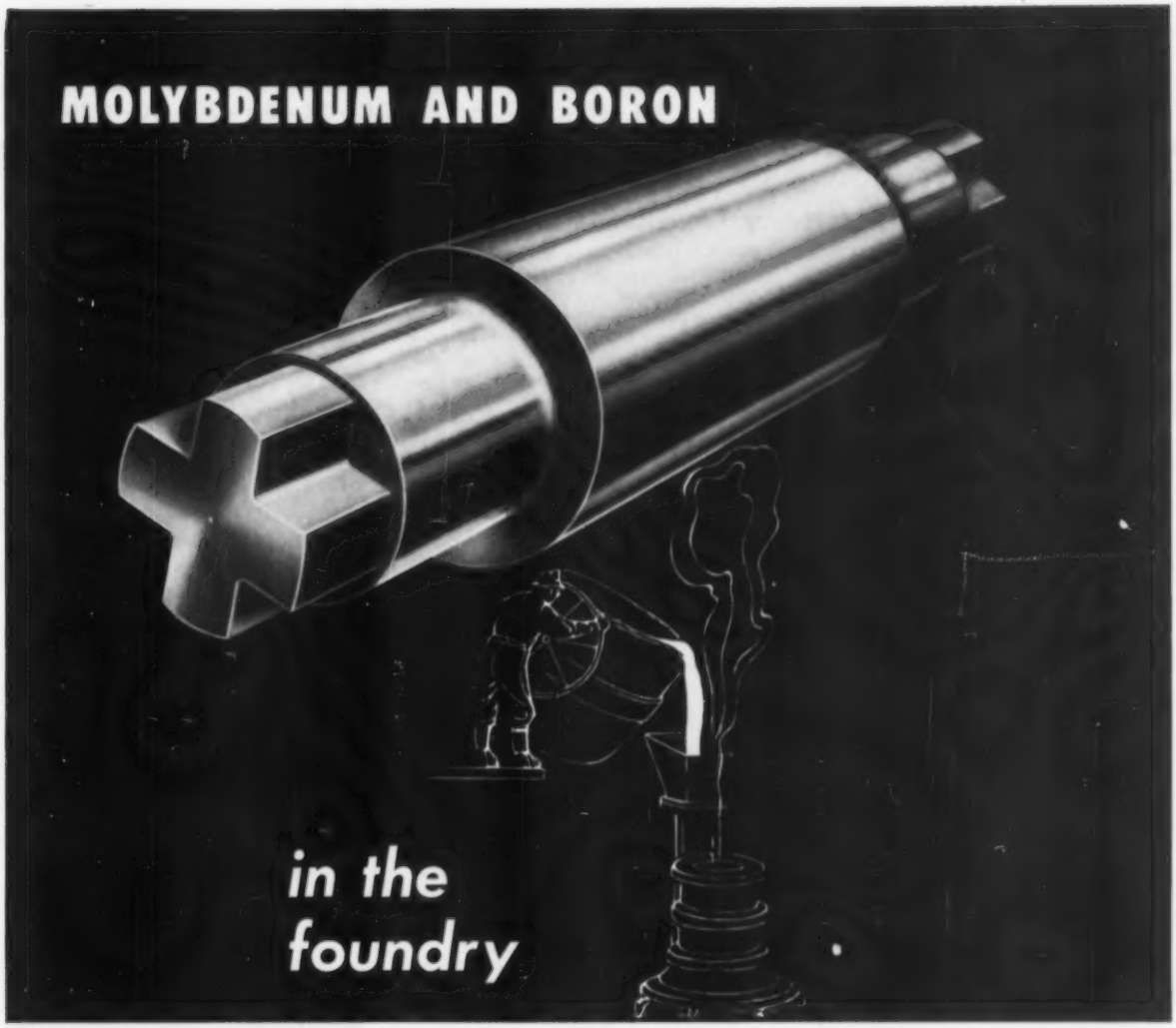


▲ Core Blower

B & P Flexiblomatic core blower is all new, all-pneumatic, all-automatic. Has no electrical contacts or relays. Blows, rolls over, and draws 240 cores per hour. Indexing of box, bowing, rollover, draw, ejection, and delivery of the box are automatic. Operator need only actuate one valve, place core plate, and remove finished core on each cycle. One operator handles two or more units since one unit requires only 20 per cent of his time. New TR Cormatic units with Flexiblomatic core blowers are available to blow, rollover, and draw cores weighing up to 60 lb. *Beardsley & Piper.*

For more facts, circle No. 225 on p. 47

continued on page 30



Rolls are among many cast, wrought iron and steel products that have been improved by Molybdenum and Boron. Very small additions, properly introduced, yield surprising results. MCA Molybdenum additions increase the resistance of rolls to breakage, chipping, heat checking and spalling in service. Molybdenum and Boron improve toughness and hardness qualities at both room and higher temperatures.

Similarly, Molybdenum and Boron are effective in improving toughness and hardness in both light and heavy iron and steel castings.

As recognized authorities in the application of Molybdenum, Tungsten, Boron, Cerium and its derivatives both as alloys and chemicals, MCA assures confidential and immediate reponse to inquiries.

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MCA

NEW TOOLS

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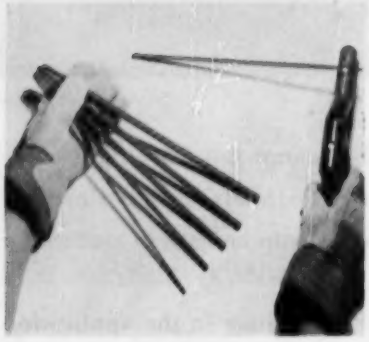
▲ Flexible Shaft Machine

M50 flexible shaft machine is multi-speed unit with ½-in. flexible shaft, 6 ft long. Powered by ¾ or 1 hp motor. By shifting belt on eccentrically mounted pulley, speed can be varied (1150, 2100, 3450, 5750 rpm). Machine capacity is: grinding wheel, 6 x 1 x 1½; sanding disc, 9-in. diameter; sanding drill, 5 x 2 x ½; buffing wheel, 6 x 1 x ½; wire brush, 8 x 1 x ½; drilling in steel, ⅜ in. diameter. *Stow Mfg. Co.*

For more facts, circle No. 226 on p. 47



▲ Hardfacing Electrode

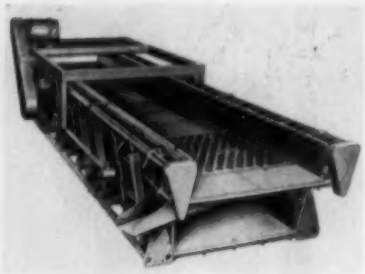
New series of general service, iron-base DC hardfacing electrodes have metallic coating that provides improved weldability and arc stability. Made up of a chromium-boron-iron composition in two types: Colmonoy No. 1 for hardfacing where extreme impact with high abrasion resistance is required; Colmonoy Special No. 1 for extreme abrasion and impact resistance. Dense deposits do not require cleaning or slag removal by chipping or brushing before welding on successive deposits. Can be used on vertical surfaces. *Wall Colmonoy Corp.*

For more facts, circle No. 227 on p. 47

▼ Vibrating Screen

Model 2-B Dual Deck Balanced Vibrating Screens provide efficient sizing, dedusting, scalping, de-watering. Dual decks operate in reverse motions, guide links permit them to follow eccentric drive movements counterbalancing each other. Available for either suspension or floor mounting, can be installed horizontally or declined, and provided in any specified length. Two common sizes are the 40 in. wide x 15 ft long screen with 80 sq ft of screening area, and the 40 in. wide x 20 ft long unit with 120 sq ft of screening area. *Syntron Co.*

For more facts, circle No. 228 on p. 47



▼ Heavy-Duty Lift Truck

Completely new, 15,000-lb capacity lift truck, Model RC-150, is said to be narrowest and shortest model in its field. It is mounted on 8.25 x 20 pneumatic tires and powered by a heavy-duty, water-cooled industrial engine. Has all-weather traction and can negotiate roughest terrain, loaded or unloaded. In addition to a capacity of 15,000 lb at 24-in. load centers, new truck is also available in capacities of 16,000 lb and 18,000 at 24-in. load centers. Described in brochure, Form No. 1287A. *Hyster Co.*

For more facts, circle No. 229 on p. 47

▲ Swing Cutoff Saws

H & A Swing Cutoff Saw with abrasive cutoff wheel saves time in both ferrous and non-ferrous shops. One foundry using 16 x 5/16 x 1 wheel cut time on one job from four days to three hours. Available in 10, 12, 14, as well as 16-in. sizes. Accurate cut minimizes or eliminates additional grinding when used for gate and riser removal. Fully automatic safety guard and automatic air operating unit (frees operator's hands for manipulating stock) available. Takes blades for wood and plastics. *Heston & Anderson.*

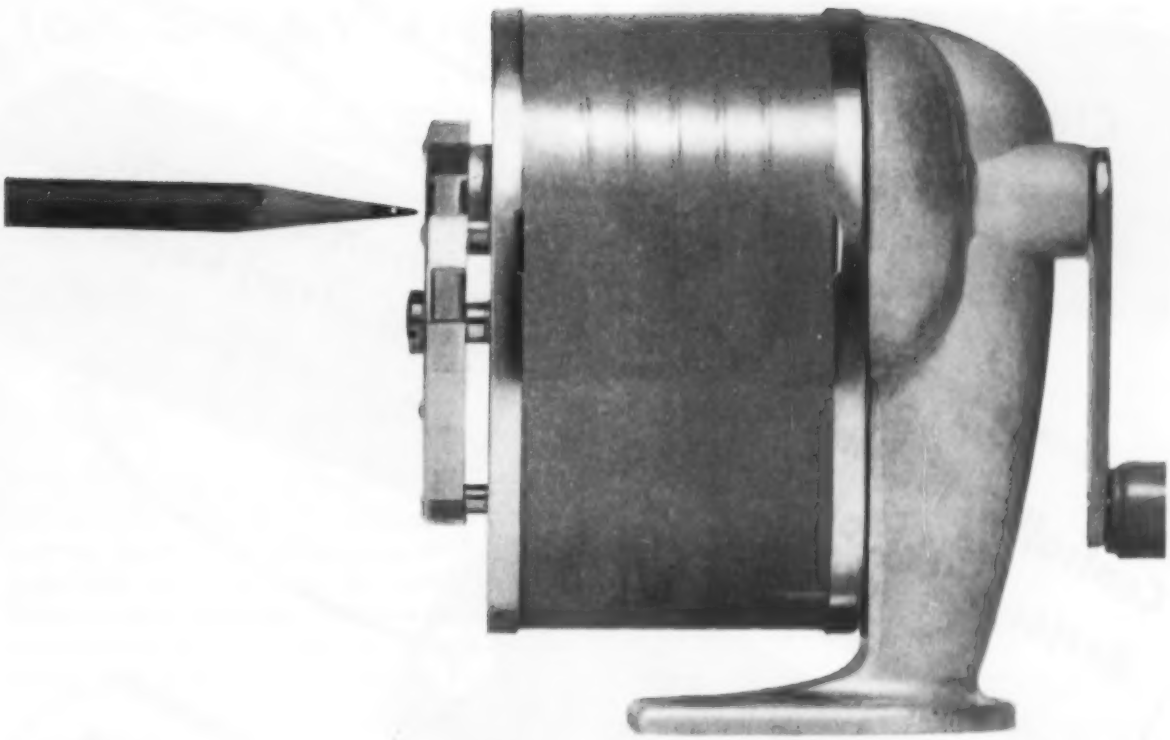
For more facts, circle No. 230 on p. 47

▲ High-Speed Magnet Crane

New installation of P & H Overhead Crane in malleable foundry has exceptionally high operating speeds for fast materials handling. Crane handles a 65-in. super-magnet, attains hoist line speeds of 160 fpm as result of unique trolley design with two 60-hp motors to drive a single hoist drum. Trolley speed is 300 fpm, bridge speed is 400 fpm. In picture, crane has 70-ft span, lifts 10 tons. *Harnischfeger Corp.*

For more facts, circle No. 231 on p. 47

continued on page 34



to make our point quickly

Take your pencil and check off *why* you should make your castings with Penolyn Core Oil. First, you are assured maximum foundry efficiency. Second, you'll find there is a grade of Penolyn Core Oil to meet the most exacting requirements of every Foundry and Core Room practice. Third, and most important —

If you require expert technical assistance or technical data regarding your present or future casting operations, just call the Penola Office nearest you.

Penola

specify PENOLYN CORE OIL

for these 10 important casting advantages:

1. Dependable uniformity
2. Concentrated form
3. No obnoxious odor
4. Seepage eliminated
5. No crusting, green mix
6. Always clean working
7. Wide temperature range
8. Polymerized formulation
9. Minimum gas
10. Ample collapsibility

PENOLA OIL COMPANY • NEW YORK • CHICAGO • DETROIT

Write your own to better castings with

Cleaner Metal
Greater Fluidity

Carbon Constant
Minimized Rejects
Reduced Sulphur

Controlled Melting
Better Machinability

Better Metal
Composition
Higher Tensile Strength

Uniformity of Hardness
Better Graphite
Distribution

For more facts, circle No. 432 on postage-free Reader Service card on p. 47 or 48

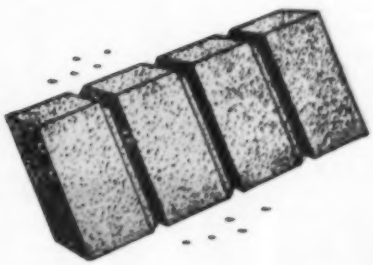
TICKET

Famous CORNELL FLUX

for GRAY IRON FOUNDRIES and MALLEABLE FOUNDRIES with CUPOLAS

Many leading gray iron and malleable foundries with cupolas have found that the small amount they spend on Famous Cornell Cupola Flux is repaid hundreds of times over, with a more efficient, less costly cupola operation. Many of these users are near your foundry. We will be glad to have our representative call and tell you of their success with Famous Cornell Cupola Flux.

Write now for Bulletin 46-B.



The Benefits... The Advantages of Famous CORNELL Aluminum and Brass Flux

Makes metal pure and clean.

Permits use of more scrap without danger of dirt, porous places or spongy spots.

Thinner, yet stronger sections can be poured.

Metal does not cling to the dross.

Crucible or furnace linings are kept clean and preserved.

Cleanses molten brass even when the dirtiest brass turnings or sweepings are used.

Saves considerable tin and other metals.

Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases.

Write for Bulletin No. 46-A

The* CLEVELAND FLUX *Company

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

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NEW TOOLS

continued from page 30

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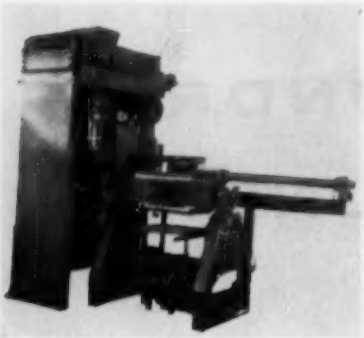


▲ Automatic Core Blower

Model 102-E Demmler core blower with stationary sand magazine is fully automatic. As illustrated, machine is with No. 6 double-core rollover draw machine and core box shuttle. New machine will blow, draw, and roll over and draw cores at up to 300 per hour with a single operator. Rugged frame and heavy working parts make for low maintenance. For routine maintenance, working parts are easily accessible. *Wm. Demmler & Bros.*

For more facts, circle No. 232 on p. 47

▲ Blast Cleaner

72-in. Wheelabrator Swing Table requires no pit for abrasive hopper; whole machine is built for floor-level installation. Particularly adaptable to job shops, the unit has a 40-in. work height clearance and is intended to handle a wide range of work. When door is open, work table comes out for easy loading and unloading. When door is shut, table rotates work under abrasive blast from a rotating bladed wheel in cabinet roof. No compressed air is needed, blasting is automatic. *American Wheelabrator & Equipment Corp.*

For more facts, circle No. 233 on p. 47

▼ All-Purpose Controller

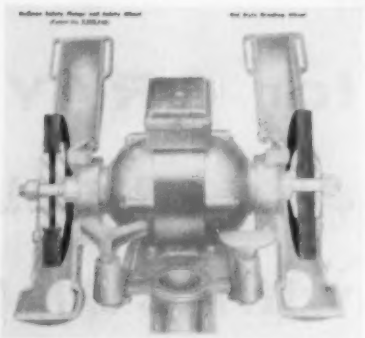
Model 41A Pneumatic Controller for simple industrial processes provides sharp on-off or narrow band proportional control of such variables as temperature, pressure, liquid level, and humidity. Foundry applications include temperature control of core ovens and control of pressure in compressed air systems. Indicates as well as controls. For on-off action, new controller snaps control valve from fully opened to fully closed when measurement crosses control point. *Foxboro Co.*

For more facts, circle No. 234 on p. 47

▼ Band Machine

New line of 16-in. band machines has 12-in. thickness capacity, is engineered for tough, straight or curved metal sawing operations. Easily arranged for band filing, metal polishing, and carbide finishing. Husky work table tilts. Saw blade welder both welds and anneals. Variety of attachments available increases versatility. Several types of work feeding attachments include power work feed, screw and ratchet work feed, and work-holding jaws. *DoAll Co.*

For more facts, circle No. 235 on p. 47



▲ Safety Flange — Grinding Wheel

New Safety Abrasive Wheel and Arbor Flange key together to prevent broken grinding wheel from flying apart before operator can stop machine on noting excessive vibration that signals wheel has ruptured. Molded wheel is gripped by outer edge of flange in normal usage; tongue of flange and groove in wheel take over only if wheel breaks. In tests, molded wheels have been deliberately broken, then reassembled in safety flanges and run far above rated speed in testing machine before letting go. *Robt. W. Hoffman Co., Inc.*

For more facts, circle No. 236 on p. 47

▲ Mounting Press

New specimen mounting press for preparation of metallurgical samples is modern in design, simple in operation, and has sturdy, girder-like construction. Design features include automatic temperature control, center ejection of completed specimen, and possibility of using both 1-in. and 1¼-in. specimen molds with same heater and cooler. Low-priced standard No. 1315 Specimen Mount Press and the more deluxe, rapid Speed Press are being retained in the company's line. *Buehler, Ltd.*

For more facts, circle No. 237 on p. 47

continued on page 36

LIKE FINDING GOLD!

That's the way it's been—for foundries that have changed to CUT STEEL during the past year. For this amazing, new type abrasive is *making money* for these foundries, by doing an incredibly better job of cleaning *and* drastically reducing cleaning costs. You see, CUT STEEL is actually *cut* from high quality, alloy steel—which gives it properties and advantages possessed by no other abrasive. If you haven't tested CUT STEEL in your cleaning room—you should! It's like finding gold!

Grade "A" CUT STEEL sells for less than most cast steel shot!
Grade "B" CUT STEEL costs no more than most malleable shot!

Sooner or later, you too, will change to CUT STEEL!

CUT STEEL
ABRASIVE

ANNEALSHOT and SUPER-ANNEALSHOT

PRODUCTS OF

METAL BLAST, INC.

872 EAST 67th STREET • CLEVELAND 3, OHIO

In its original form, CUT STEEL resembles steel grit, with sharp edges and corners.

In usage, it rapidly changes to a spherical shape, in a wide variety of sizes.

NEW TOOLS

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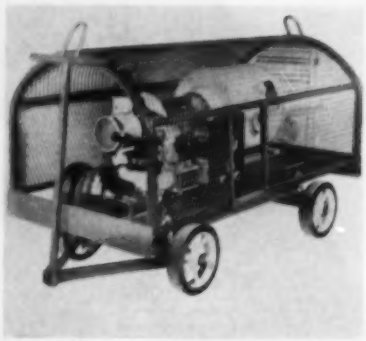
Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.

▼ Wheel Dresser

Longer life, quicker, easier cutter change are latest improvements in Desmond-Huntington Dressers. New construction features hardened side washers that stay tight and withstand long wear. To change cutters, simply remove one bolt, slip out hardened spindle, reinstall with new cutters in place. Use wrench or screw driver. Furnished in four sizes: 1, 2, 21, and 22. *Desmond Stephan Mfg. Co.*

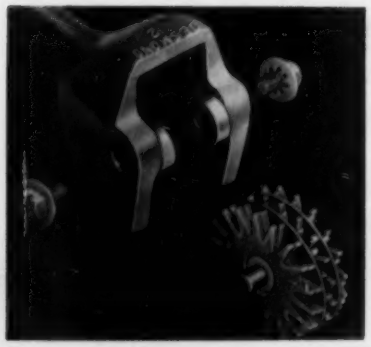
For more facts, circle No. 240 on p. 47



▲ Masonry-Cutting Blade

Polk-A-Dot Break-Resistant Abrasive Blades cut every masonry material—hard, medium, and soft—with the efficiency of conventional blades and the added safety of scientifically designed reinforcing. Glass fiber webbing reinforces out to cutting edge and on both sides of hub. Raised abrasive polkadots on each side of blade give extra cutting efficiency, reduce side friction and drag. Blades run cooler, smoother, cut faster, last longer. Standard sizes are 12, 14, and 18-in. diameters. *Clipper Mfg. Co.*

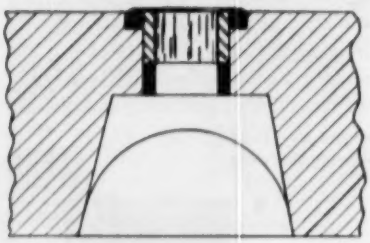
For more facts, circle No. 238 on p. 47



▲ Mold Dryer

Milwaukee Mold Dryer is light, portable unit, requiring only 3 x 6 ft of floor area. Can be put into operation on a mold in less than five minutes. Completely automatic, requires no attendant. Manufacturer asserts unit saves up to 60 per cent of cost of a conventional mold dryer, and more than 80 per cent of the cost of a mold drying oven. Dries mold in 1/6 the time required for electric infrared or charcoal. Burns any commercial gas. *Heat Transfer Div., Milwaukee Shipbuilding Corp.*

For more facts, circle No. 242 on p. 47



▼ Air Line Protection

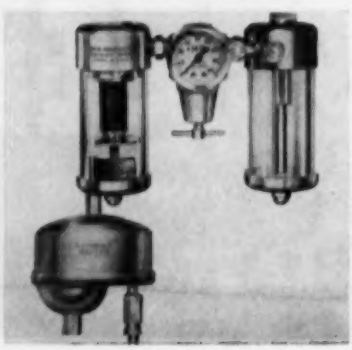
Filter, regulator, and lubricator assembly combines automatic air trap which is readily installed in assembly by removing drain cock on filter and screwing trap into place. Filter removes solids 0.00039-in. and larger. Regulator can pass large volume with an unrestricted flow and minimum pressure drop. Self-bleeding, compact. Lubricator bowl can be refilled without shutting off air supply. Assures dry air in pneumatic systems at all times. *M & B Products.*

For more facts, circle No. 241 on p. 47

▲ Blow Box Sealing Rings

Martin Engineering has a series of new sealing rings designed to seal around liner tubes in core box blow holes. Positive protection against blow-by or blowout is afforded. Life expectancy is almost unlimited. No adhesive is needed to hold sealing rings in place. Available in 21 sizes from ¼ to 1½ in. ID, the rings are also used to seal around vent rods. *Martin Engineering Co.*

For more facts, circle No. 239 on p. 47



▲ Safe Underfoot Coating

Carbo-Tread J-174-E is a tough, resilient safety top coating for floors, stairways, and steel plates. Is fine-grained, ready-mixed compound of trowel consistency, can be applied over wood, concrete, steel, tile, or mastic surfaces. Sets by both dehydration and compression and is ready for traffic 24 hr after trowelling in place. Produces smooth surface in attractive light gray color. Described in Bulletin M-1219C. *Maintenance Inc.*

For more facts, circle No. 243 on p. 47

continued on page 39

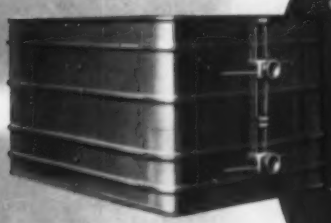
$AVE with $TERLINGS

Rolled Steel Channel Flasks Last Longer— Cost Less Per Year!

Sterling Steel Flasks are money-savers for foundrymen all over the world. The famous ROLLED STEEL CHANNEL construction gives Sterling Flasks the strength and rigidity to withstand tremendous pressures, year after year. They last much longer . . . and, what is even more important, they guard against casting failures. Check the service records of Sterling Steel Flasks in any production foundry. You'll find they bring the annual flask cost down to rock bottom. When you buy the best . . . you're bound to get a bargain. That's why 13,000 foundries, world-wide, use Sterling Flasks. The Sterling branch near you will gladly give information and estimates — or write to factory.

Style "AD" with Double Pin Lugs

Style "E" with Pin Lugs and Handles Combined

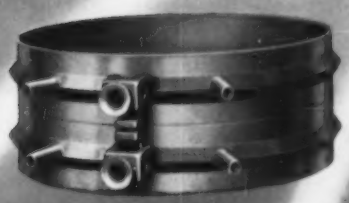


Style "½ND-RT Cope" } Heavy Duty Flask
Style "½NS-RT Drag" }

Style "H" with Pin Lugs Welded on Sides

Style "GSX" with Single Pin Lugs and Two-Man Lift Handles

Style "LS" with Angle Reinforcement and Two-Man Lift Handles



Style "BLST" with Trunnions and Two-Man Lift Handles

Style "AD" Flask Sections Stacked One Above Another for Multiple Molding

Style "½ND-RTX Cope" — Style "½NS-RT Drag" with Heavy Duty Clamps

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.

Branches: Boston • Buffalo • Chicago • Cleveland • Detroit • Palo Alto • New York • Philadelphia • St. Louis

Subsidiary Company: STERLING FOUNDRY SPECIALTIES, Ltd., London, Bedford and Jarrow-on-Tyne, England

$AVE with $TERLINGS

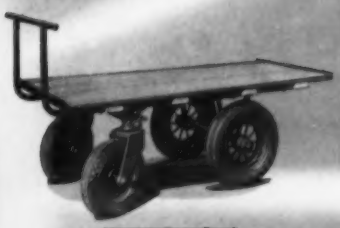
It Pays to Invest in the Best — STERLING Foundry Equipment

Economy-minded foundrymen put their faith in Sterling foundry equipment. In addition to flasks and flask accessories, Sterling produces trucks, carts, wheelbarrows, slag buggies, etc., custom-built for heavy-duty foundry service. Every piece of equipment is backed by the well-known Sterling reputation for correct design and excellent workmanship. Sterling equipment costs less, because it lasts longer. It can take hard, everyday punishment and invariably come back for more. Consult Sterling the next time you require foundry equipment. The Sterling branch near you will gladly give information and estimates — or write to factory.

No. DF4-S Heavy Duty Wheelbarrow

No. 47 Casting Cart

No. 50 Slag Buggy



No. 110 Core Truck

No. D4W Wheelbarrow for sand and other dry materials

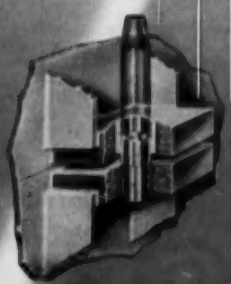
No. 160 Heavy Duty Casting Truck

Heavy Duty Cart with "3-Point Landing"

Standard Type "S" Flask Pin

Sterling Flask Clamp

No. 630-S Cart with Steel Wheels



Stub Pin Shift-pusher

Style X Core Plate

Standard Hardened Steel Bushing

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.

Branches: Boston • Buffalo • Chicago • Cleveland • Detroit • Palo Alto • New York • Philadelphia • St. Louis

Subsidiary Company: STERLING FOUNDRY SPECIALTIES, Ltd., London, Bedford and Jarrow-on-Tyne, England

NEW TOOLS

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▼ Sand Bucket

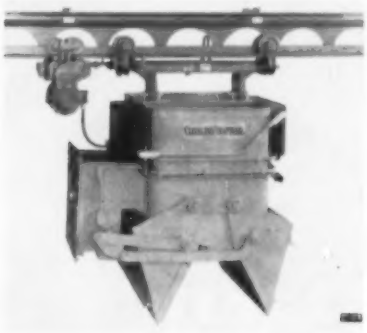
Traveling bucket for sand and other dry granulated or lump materials has been designed for use on Cleveland Tramrail overhead track and crane systems. Powered by tractor drive, the bucket can be dispatched to various points and the materials unloaded automatically. Unit then returns to the loading point for refilling. Bucket has capacity of 22.5 cu ft and is rated at 2000 lb. Gate is split-hinged, and is operated by motor. *Cleveland Crane & Engineering Co.*

For more facts, circle No. 246 on p. 47

▲ Polishing Table

Latest development in specimen polishing apparatus for the metallographer is a new streamlined, all-metal polishing desk in singe, two, or three-unit models. Desk height, table is finished in gray hammertone. Formica on top and back eliminates metal rims that might form pockets for water and dirt. Features over-size wash bowls, swing spouts to supply water over polishing wheel or bowl. Polishing heads are well-known Buehler models. Companion storage cabinets available. *Buehler Ltd.*

For more facts, circle No. 244 on p. 47



▲ Work Measurer

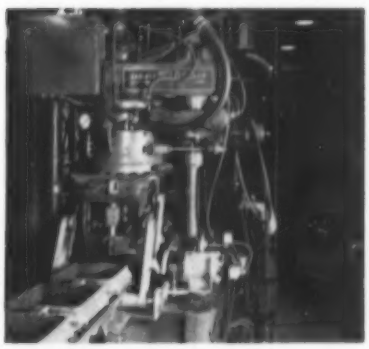
Workometer installed on electric grinders, belt sanders, band saws, abrasive cutoff machines, and arc welders furnishes visual means of determining amount of work performed and the operator's pay, each day, without complicated setting and maintaining of piece work incentives. In addition to standard Workometer, special units are available for high-cycle tools and for arc welders. Workometers are leased, inspected, sealed, serviced, and accuracy maintained by *Stewart Instrument Co.*

For more facts, circle No. 248 on p. 47

▼ Portable Grinders

New line of portable grinders includes B-7 Vertical (see picture), D-4 for wheels and cones, D-6 for wheels, the heavy duty D-8 for 6 and 8-in. wheels. Cup wheels, sanding pads, or disc or cutoff wheels can be used with the B-7. All models are lightweights (use magnesium castings) and easily handled by operators. All are powered by "swastika" design air motors with direct acting governors and built-in oiler and air strainer. Bulletins: 43, 44, 45, 47. *Rotor Tool Co.*

For more facts, circle No. 247 on p. 47



▲ Portable X-Ray Unit

New type of portable x-ray unit can give 360 degree radiation sweep to cut operating time by as much as 97 per cent. Can also operate as a conventional type with limited angle cone of radiation. Model No. OX-175 consists of 185-lb tube head and transformers linked to 145-lb control. Operates at tube voltage from 45,000 to 175,000. Can be mounted and used in field, shop, and laboratory. Contains automatic safeguards against improper operation. *X-Ray Dept., General Electric Co.*

For more facts, circle No. 245 on p. 47

▲ Mold Handling Attachment

Facilities for improved handling of flasks have been added to the San-Blo mold blower. Photo shows cantilever arms that move empty flasks into the machine and finished molds out. Also available is a conveyor attachment for rolling flasks in and out of the machine. San-Blo is a fully automatic, one-man-operation machine for blowing cope, drag, or stack molds weighing up to 150 lb. It features the "Cyclo-Air" blow head and "Low Pressure Prefill." *Federal Foundry Supply Co.*

For more facts, circle No. 249 on p. 47

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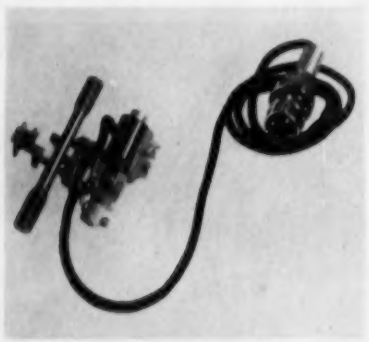
▲ Die Casting Machine

New, low-cost, high-speed die casting machine handles up to 2½ lb shot, features all steel welded construction, 80-ton locking pressure, automatic electric cycling (up to 700 shots per hr), 17¾-in. square die platen, 6½-in. stroke, blast-type furnace blower, highest grade controls and valves mounted for easy maintenance. Available in air or hydraulically operated plunger goose neck type for zinc, tin, and lead or cold chamber type for aluminum, brass, and magnesium. *American Die Casting Mach. Co.*

For more facts, circle No. 250 on p. 47



▲ Snap-On Extensometer

A new non-averaging, snap-on Microformer (miniature variable transformer) type extensometer for use on sub-size round specimens, features short gage lengths and interchangeable attachments for gage lengths of ½, ¾, and 1 in. Specimens may be from ⅛ to ¼ in. diam. Model T-2M extensometer is intended for use with Microformer-type recorders in determining elastic properties such as offset yield strength. Strain magnifications are 250, 500, and 1000 to 1 with a measuring range of 0.02 in. *Baldwin-Lima-Hamilton Corp.*

For more facts, circle No. 251 on p. 47

▼ Electric Chain Hoist

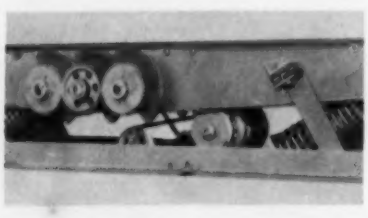
Designed for low maintenance costs, the CM Lodestar electric chain hoist features shock-proof push button control, sealed-in lifetime lubrication, self-adjusting heavy duty brake, overload protection, fully enclosed and protected components, and safety limit switches. Jam-proof chain guide and non-kinking flexible link chain permit extreme angle pulling. Interchangeable suspensions insures fast service. The CM Lodestar is available in capacities from ⅛ to 1 ton (¼-ton model weighs only 51 lb). *Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.*

For more facts, circle No. 252 on p. 47

▼ Oscillating Conveyor

The G-W Oscilveyor is a vibrating trough oscillated by centrifugal forces of rotating eccentric weights. Designed with a minimum of moving parts, it requires practically no maintenance. Material may be fed up inclines of as much as 5 degrees. A single 5-ft drive section may be any place along conveyors up to 200 ft long. Standard 10-ft trough sections may be bolted together in a few minutes. Troughs may be from 8 to 24 in. wide and of any material. *Gifford-Wood Co.*

For more facts, circle No. 253 on p. 47



▲ Electric Wire Rope Hoist

Completely new Type J-3 electric wire rope hoist is available with either two- or single-speed push button magnetic control in sizes of 1000, 2000, and 4000-lb capacity. Powered by a 2 hp motor designed specifically for hoist duty, the J-3 has 18-ft lift without overwind — 25-ft lift. Magnetic, disc-type motor brake opens when the hoist starts and closes instantly when the current is shut off — assuring accurate load spotting. *Robbins & Myers, Hoist & Crane Div.*

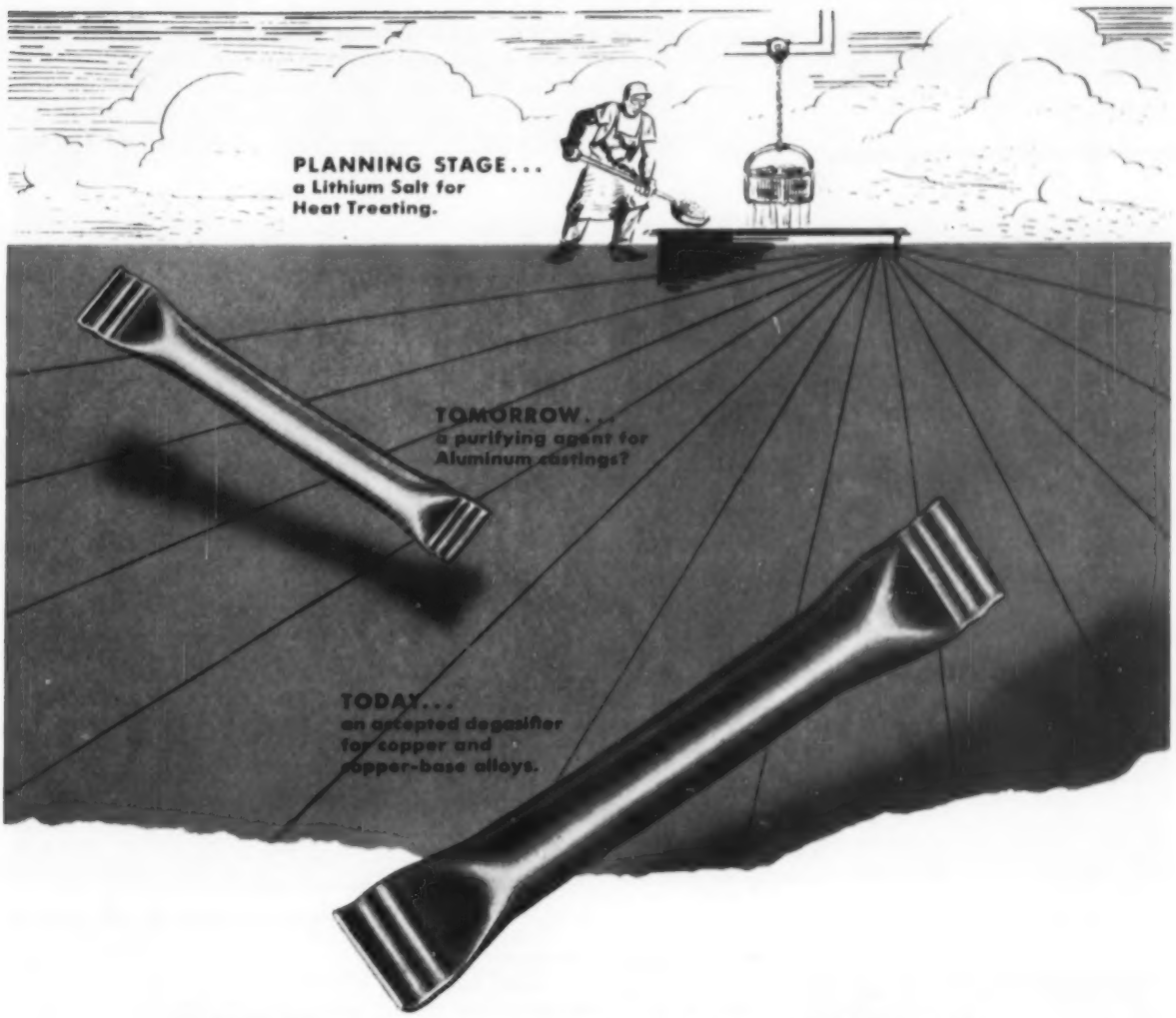
For more facts, circle No. 254 on p. 47

▲ Direct Reading Spectrometer

Designed particularly for foundry use the small, direct reading Spectromet offers instant control of melts without an air-conditioned laboratory. Focal curve, entrance optics, exit slits, and photomultipliers are strategically enclosed in an airtight compartment at one end of the container; a smaller enclosure covers the concave diffraction grating; the entire system is sealed against dust. Accommodates six elements in one matrix. *Baird Associates, Inc.*

For more facts, circle No. 255 on p. 47

continued on page 42



LITHIUM METALLURGY

Lithium has been long established in the nonferrous foundry industry as a degasifier, deoxidizer, desulfurizer and general purifying agent. The small amounts required put both the economics and technique within the limits of everyday nonferrous foundry operation. Now, tests under certain production conditions indicate that Lithium is equally valuable as a degasifier for aluminum castings. Still in the realm of research, Lithium Salts hold vast promise of valuable benefits for low temperature heat treating baths. Why don't you look into this miracle element? This revolutionary technique is within *your* reach. Write for the details.

. . . trends ahead in industrial applications for Lithium

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CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota

For more facts, circle No. 434 on postage-free Reader Service card on p. 47 or 48

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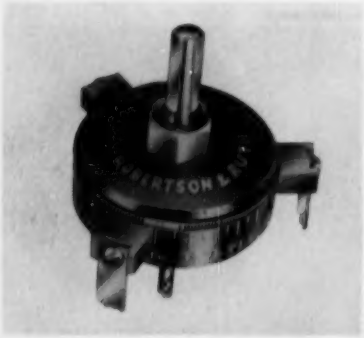
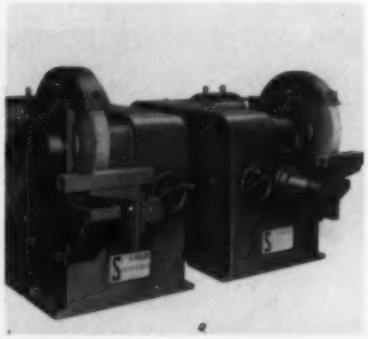


▼ Improved Die Casting Machine

Fully automatic, new Model BH-30 has increased power and higher speeds. 4 in. diam. tie bars and channel steel base extending the entire length of the 12-ton machine provide stability for proper application of the 400-ton die clamping pressure. Wide-spaced tie bars, large plates, and 12-in. stroke permit large, deep-draw castings to be produced. Up to 25 lb zinc can be injected at pressures of 2000 psi at speeds of 400 fpm. Plunger gooseneck can be changed readily to cold chamber. *Kux Machine Co.*

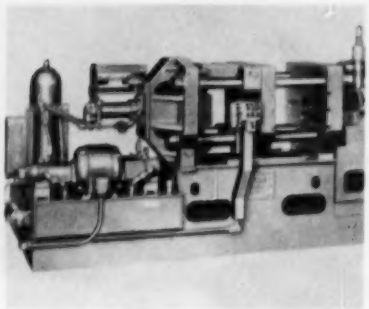
For more facts, circle No. 258 on p. 47



▲ Wide Range Hole Saw

New Model 400 Dial Saw with increased hole cutting range, cuts holes from 1⅛ to 3½ in. diam. in wood, plastics, and metal. Three high-speed-steel cutting blades adjust simultaneously to size by rotating the dial which is calibrated in pipe and conduit sizes as well as in ⅛th inches. Other sizes can be set easily by measurement. Used also as a rotary planer, inlaying tool, or grooving tool; it can be used with electric and manual hand drills, drill press, lathe, and milling machine. *Robertson & Ruth.*

For more facts, circle No. 256 on p. 47



▲ Snagging Grinder

Improved design of Infinitely Variable Speed Snagging Grinders reduces costs as much as 30 per cent. Either right hand or left hand single wheel machine has a hand wheel at the front to maintain exact sfpm throughout wheel life; guard is simultaneously positioned for maximum safety. 90% of down time in changing wheels is eliminated with quick-acting latches that require no effort or tools to open guard. Grinder sizes are from 5 hp, 20-in. to 100 hp, 30-in. wheels. *Standard Electrical Tool Co.*

For more facts, circle No. 260 on p. 47

▼ Industrial Hammer

Aluminum-magnesium Hefty-Hammer lasts from 10 to 15 times longer than most standard, soft-faced tools. Work hardening, mushrooming, and chipping are eliminated in this non-marking hammer featuring 13% elasticity; that will not chip or shear, that can be dressed and redressed. Cast hammer handle can be bent double without breaking. Perfect balance is assured and fatigue is lessened by dimpled finger grips and accurate positioning of the center of gravity. Sizes range from one to five pounds. *Little Beaver Industries.*

For more facts, circle No. 259 on p. 47

▲ Thread Repair Kits

With the new Heli-Coil Shop-Packs, stripped threads can be repaired quickly and permanently on the spot without sending equipment out of the shop. Each kit contains a quantity of thread inserts, tap, and inserting tool. Sizes range from 6-32 to 1½-6 in. both N. F. and N. C. Series. Stainless steel wire thread inserts provide strong, permanent threads that are resistant to wear, corrosion, seizing, and galling in iron and steel as well as aluminum, magnesium, copper, plastics, and wood. *Heli-Coil Corp.*

For more facts, circle No. 257 on p. 47

▲ Rail-Mounted Crane

First of the new 7½-ton Rail-Mounted Cranes has just been supplied to a foundry operation to lift pig iron and scrap into charging buckets. This crane, designed to lift 7½ tons at 7½ ft radius is available in either gas-electric or diesel-electric. Using a General Electric Thyrite Generator set, so that an additional engine is not necessary, the crane handles a 39-in magnet. *Coles Cranes, Inc.*

For more facts, circle No. 261 on p. 47

continued on page 44

600 POUNDS OF BRONZE melted in 23 minutes

This steel and non-ferrous centrifugal-casting foundry saves more than time through the use of Ajax-Northrup induction furnaces. Freedom from contamination and almost complete metal recovery are direct results of the high speed characteristic of the Ajax-Northrup melting principle. Electrical energy, used as the source of power, is expended almost entirely in the charge. Little is wasted on the refractory lining or outside the furnace, thereby making working conditions better and more efficient at the same time.

Many Ajax-Northrup furnaces are made to accept either ferrous or non-ferrous work . . . with impressive savings for both. With non-ferrous alloys savings of over $33.00 a ton are reported in reduced metal losses alone. And for ferrous work, recovery is reported as high as 100% for nickel and 99% for chromium.

Economy recommends it, progress demands it; induction melting is fundamental to modern precision foundry work. Write for Bulletin 27-B . . . Ajax Electrothermic Corp., Trenton 5, New Jersey.

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.

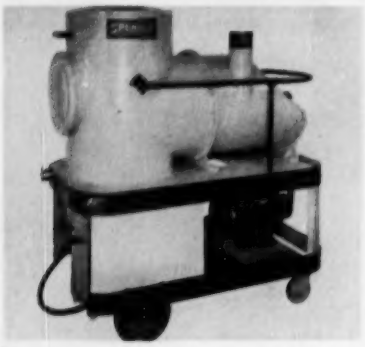
AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

NEW TOOLS

continued from page 42

Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.



▲ Industrial Vacuum Cleaner

The new 5 hp belt driven portable vacuum cleaner model P-142BD is particularly applicable to foundries due to the fact that the small size allows the machine to be moved through narrow and small areas yet there is power enough for two men to work from the one machine at the same time. This model has a multistage turbine for producing vacuum, large dirt capacity, is easily cleaned, is light weight and easily portable, of rugged construction with welded frame. *Spencer Turbine Co.*

For more facts, circle No. 262 on p. 47

▲ Finishing Barrel

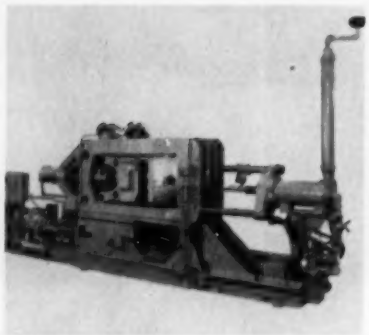
A low-cost, standard Honite barrel finishing machine, model VS, features enclosed moving parts, pivot-mounted gate which closes when the machine is in operation, and a magnetic brake. Motor, speed reducer, speed changer, and brake are mounted in a single unit at the rear facilitating lubrication and allowing the cylinder to be removed easily. Large amount of space beneath the barrel facilitates rapid unloading. All controls are front-mounted at working height. *Minnesota Mining & Mfg. Co.*

For more facts, circle No. 263 on p. 47

▼ Aluminum Die Casting Machine

The HP-3X-SF 600-ton aluminum die casting machine with Lester pre-fill injection system will cast up to 16 lb of aluminum or proportionate weights of magnesium or brass, and is convertible to zinc. 33,200 psi max. pressure is applied on metal. Shot speed and pressure are adjustable giving high speed injection. Angled support bars of the injection system simplifies pouring. Water-cooled plunger tip prevents binding. Die opening is 14 in., completely unobstructed movable platen is 40 in. wide. *Lester-Phoenix, Inc.*

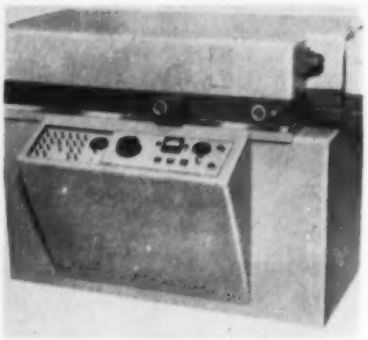
For more facts, circle No. 264 on p. 47



▼ Electric Truck Hoist

Model 1000 Electric Hoist-O-Matic Truck Crane with push-button control lets one man do the work of two or more. Operated anywhere within radius of 8 ft from crane, loads up to 1000 lb can be handled. Four-foot boom swings 360 degrees. Crane is 6 ft high. Power unit mounted in base of crane. Requires only 18 x 23 in. of mounting surface. Long 50-ft cable lends itself to all types of load skidding operations. Installation requires drilling only five holes and connecting electric cables to truck battery. *Hoisters, Inc.*

For more facts, circle No. 265 on p. 47



▲ Spectrochemical Analyzer

Quantograph combines features of a spectrograph, a monochromator, and the ARL Quantometer, and performs the complete functions of each. Said to incorporate the advantages of three concepts in spectrochemistry: photography of spectra for complete analysis, polychromatic spectrometry for direct-reading quantitative analyses, and monochromatic spectrometry for qualitative and quantitative analyses. Combines versatility of the spectrograph with accuracy of the Quantograph using integration, simultaneous ratio principle. *Applied Research Laboratories.*

For more facts, circle No. 266 on p. 47

▲ Face Plate Lathe

No. 28 T-Lathe has been designed expressly for face plate turning. Lathe has 4-ft bed with a hand feed carriage, with swivel cross slide and tool post. Face plate is mounted directly on the 2 hp geared-head, variable-speed motor, and has remote control so the operator can change and read directly the rpm from his operating position. Spindle speeds are 250 to 3000 rpm. Maximum diameter swing over carriage is 20 in. Maximum diameter swing over bed is 24 in. *Oliver Machinery Co.*

For more facts, circle No. 267 on p. 47

continued on page 46

Win $500 FIRST PRIZE

enter the 1955

GRAY IRON REDESIGN CONTEST

2ND PRIZE $250 **3RD PRIZE $100**

Make your redesign ideas pay off in cash! You are eligible if you have redesigned a product or part for production in gray iron which economically and efficiently replaced a competitive material. Regardless of how simple or complex your entry may be, you have a good chance of winning.

FOLLOW THESE EASY CONTEST RULES

1. Select the best example of products or parts that you have redesigned for production in gray iron.
2. Give all facts leading up to your redesign . . . why you thought of gray iron . . . how much was saved in labor and/or material costs . . . how much efficiency was gained and any other factors leading to your decision.
3. Submit an 8″ x 10″ glossy photo of the gray iron casting with your entry. If possible, also submit a similar photo of the original design.
4. Your entry must be in the mail by July 1, 1955 the contest closing date. Address: Redesign Contest, Gray Iron Founders' Society, Inc., National City-E. 6th Bldg., Cleveland 14, Ohio.
5. Contest is open to all persons engaged in the metal-working trades . . . entries may be made jointly by two or more individuals. Awards will be made at the 27th annual meeting of the Society in Milwaukee, Oct. 21, 1955.

These examples of previous award winners show how easy it is to be a winner yourself . . .

Make it better with Gray Iron

▲ 22 parts were eliminated when the fabricated design of this hydraulic circuit was redesigned in gray iron.

▲ Redesigning this table top in gray iron saved 15 hours in production time.

Original costs were reduced 83% by redesigning this screw nut as a cored gray iron casting. ▶

GRAY IRON FOUNDERS' SOCIETY

NEW TOOLS

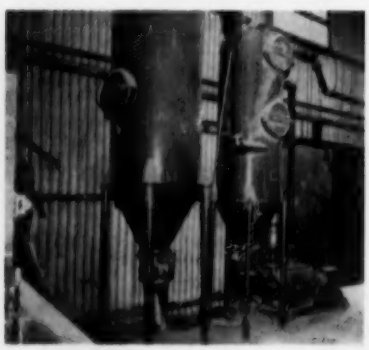
continued from page 44

Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50 fill out prepaid postcard on pages 47 or 48.

▲ New-Shaped Pig Iron

Improved shape is being introduced to 10-lb pig users. New pig is flat, measuring only 1⅜ in. thick, 6½ in. long, and 5¾ in. wide. Weight runs nine to 11 lb. Silvery pig may be charged by count. Advantages of new shape include: no free carbon pockets, no shrink, finer grain structure, better mix and faster melting with lower coke consumption, easier handling, larger load per magnet and less breakage, and storage of larger tonnages in enclosed areas. *Hanna Furnace Corp.*

For more facts, circle No. 268 on p. 47



▲ Stationary Vacuum Cleaner

System consisting of centrifugal exhauster for moving the air, dust separators for collecting the material, and a piping system for conveying the material from inlet valves conveniently located throughout the areas to be cleaned. Units can be furnished in sizes to permit from one to 20 men to clean simultaneously. In addition to cleaning floors, walls, and other building areas, vacuum cleaner can be used for cleaning molds, cores, and for the removal of shot. Bulletin A939 available. *U. S. Hoffman Machinery Corp.*

For more facts, circle No. 269 on p. 47

▼ Shell Core and Mold Machine

The Blo-Core Shell Machine has been developed to take full advantage of the shell mold process. Unique machine can produce both shell molds and shell cores separately or simultaneously. It can be operated for high production or small production; it is adaptable to small foundries as well as high production foundries. Machine utilizes the principle of blowing, at low pressures, resin coated sands into heated core boxes to produce shell cores. Shell molds can be produced by blowing into heated patterns or die cavities. *C & S Products Co.*

For more facts, circle No. 270 on p. 47

Hole Saws

Hole-Master, multi-blade and single cut hole saws are available for bit brace, power tool, and ratchet handle attachment for use on metals and wood. One model accommodates 11 sizes of blades. Blades are available in depths of 1, 1½, and 2¼ inches. *Misener Mfg. Co., Inc.*

For more facts, circle No. 271 on p. 47

Dustless Blast Cleaner

Mono-Kleen, spherical mineral shot, is non-metallic and dustless—saves production time, material cost, and equipment maintenance. One pass cleaning, reclaimable, no health hazard, chemically inert, does not absorb moisture or set up magnetic currents. *Baldwin-Hill Co.*

For more facts, circle No. 272 on p. 47

Foundry Water Flocculant

Lytron 886 is effective in concentrations of as little as two parts per million for removing suspended solids from foundry wash waters. Community laws, civic pressures, and limited water supply are met with an initial lime treatment and then Lytron 886. *Monsanto Chemical Co.*

For more facts, circle No. 273 on p. 47

Water Soluble Phenolic Resin

Production of cores with a shell mold finish and elimination of cereal and water as core binder ingredients are the chief advantages of Foundrez 7581. Mix in a cold muller, blow with a conventional machine, cure in minutes rather than hours, minimize finishing. *Reichhold Chemicals, Inc.*

For more facts, circle No. 274 on p. 47

Cast Iron Welding Electrodes

Nicol-Rod No. 99, with a special powered iron coating, alloys pure nickel with iron to produce dense, high strength, machinable welds in gray, malleable, and ductile cast irons. Arc is self-starting, and is more stable on low, open circuit voltages. *Marquette Mfg. Co.*

For more facts, circle No. 275 on p. 47

Dye Penetrant Inspection

Spotcheck is needed and effective wherever small areas of clean parts are to be tested for any surface defects. Completely portable; all materials are in pressurized cans which prevent spilling and contamination; a little goes a long way. No other equipment needed. *Magnaflux Corp.*

For more facts, circle No. 276 on p. 47

Sand Color Card

Sand Colors, shade card, No. 320-D contains full information regarding the use of colors for easier, surer identification with colored core sands. Coloring sands helps create greater efficiency in the core room. Color cards are available to interested readers. *Geigy Dyestuffs.*

For more facts, circle No. 277 on p. 47

Flowability Additive

Esso-Flo added to core and molding sands improves flowability, collapsibility, and casting finish. A non-toxic cob flour, Esso-Flo reduces sand hot strength at 1000 F and increases hot strength moderately at 2000 F, tends to eliminate scabs, buckles, rat-tails, and veining. *S.Obermayer Co.*

For more facts, circle No. 278 on p. 47

Single Pass Heat Exchanger

Single pass recuperative-type hot blast system of thin-wall alloy steel tubes is lighter and requires less floor space than conventional two-pass system. Particularly applicable to shops melting up to 100 tons per day in either open or closed top cupolas. *Whiting Corp.*

For more facts, circle No. 279 on p. 47

NEW TOOLS

Here are some of the New Tools of the Castings Industry that have made news since the 1954 AFS Convention. For more facts on items listed on pages 14-15-22-26-28-30-34-36-39-40-42-44-46-47-48-50 fill out prepaid postcard on pages 47 or 48.

Metal Reclaiming Mill

Aluminum or magnesium is reclaimed from its dross and skimmings in a dry milling process that utilizes pneumatic classification by exhausting waste from discharge side of crushing rolls. Metallics are retained in the machine and are removed periodically. *Dreisbach Engineering Corp.*

For more facts, circle No. 280 on p. 47

Hydraulic Aerial Platform

Giraffe Model I. G. 40 lifts workmen, tools, and materials up to 40 ft—450 lb without outriggers, 1000 lb with; foot controls leave operator's hands free at all times; platform superstructure, power source, and counterweight all on 360° revolving turntable. *Pitman Manufacturing Co.*

For more facts, circle No. 286 on p. 47

New Line of Fire Brick

Made of carefully selected, tested clay by the de-aired, extruded, and repressed process, S. M. fire brick have high strength, low porosity. Flintex S. M.—super-duty, Robinson S. M.—high-heat-duty, and W. W. Co., S. M.—low-heat-duty. *Robinson Clay Product Co.*

For more facts, circle No. 281 on p. 47

Improved Core Binders

Linbond No. FB-72 is clean to work with and saves baking time. Top-Bond "B" green sand spray saves over-baked cores. Aqua-Set, resin-type binder, liquid or powdered, is odor-free in mixer or at bench. Korbond is improved for faster bake and tougher qualities. *United Oil Mfg. Co.*

For more facts, circle No. 287 on p. 47

More data, information, prices can be obtained on all advertised and listed products, bulletins, services by using postage-free Reader Service card

Table Traverse Bandsaw

Exceptional feature of Journeyman Model 20-W tool and die contour bandsaw, in addition to optional filing machine conversion and built in welder, is table traverse by foot pedal controlled counter weight, without changeover, extra motor, or hydraulic feed. *Roll-In Saw Co.*

For more facts, circle No. 282 on p. 47

Portable Industrial X-Ray

Bantam-weight Tri-Ind-X Industrial X-Ray Machine features 65-lb transformer and tube head operating continuously at 260 KVP and 10 Ma, easily positioned without heavy crane or expensive crew. Power and cooling, cables and hose are on separate caster carts. *Triplett & Barton, Inc.*

For more facts, circle No. 283 on p. 47

Liquid Phenolic Resin

Foundrez 7429, liquid resin, by eliminating special equipment, "extras," and by reducing the amount of resin required as much as 50 to 75 per cent, decreases overall production costs ½ to 1/3. Shell smoothness and dimensional accuracy are maintained or improved. *Reichold Chemicals, Inc.*

For more facts, circle No. 284 on p. 47

Special Shell Molding Sand

L-R Shell-Molding Penn-Sand is a specially processed, pure silica sand that produces strong, durable shells with less resin. High refractoriness, wide screen distribution, and low confined expansion of L-R produces quality castings with excellent finish. *Pennsylvania Glass Sand Corp.*

For more facts, circle No. 285 on p. 47

Reader Service Dept. 55|5

Please have manufacturer send me without obligation information or bulletins indicated by numbers circled. For uncoded advertisements and Here's How items show page numbers on line below. For reprints or bibliographies show code numbers on line below.

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COMPANY _____

ADDRESS _____ CITY AND ZONE _____

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BUSINESS REPLY CARD

First Class Permit No. 83, Sec. 34.9 P. L. & R. DES PLAINES, ILL.

Reader Service Dept.

AMERICAN FOUNDRYMAN

Golf & Wolf Roads

Des Plaines, Illinois

Free Foundry Information

Fill out postcards on pages 47-48 for complete information on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50

Hardness Tester

New four-page, illustrated, folder describing the King Portable Brinell Hardness Tester that makes standard Brinell tests and can be used as a bench tester or taken to the job and used in any position anywhere has recently been published. *Andrew King.*

For more facts, circle No. 288 on card

Industrial Instruments

Catalog 5002 describes Honeywell industrial instruments and equipment, including the latest developments. Covers such subjects as: temperature, humidity, pressure, vacuum, flow, liquid level, conductivity, pH and other factors. *Minneapolis-Honeywell Regulator Co.*

For more facts, circle No. 290 on card

Carbon-Free Liquidizer

Brochure, now available, describes Soffel's Carbon Free Liquidizer for steel, gray iron, monel, bronze, copper castings and ingot steel. Liquidizer eliminates carbon pick-up in alloy irons and stainless steel and is exothermic. *Pittsburgh Metals Purifying Co.*

For more facts, circle No. 292 on card

Sand Additive

Brochure now available, points out how basically, Lyquaflour functions in sand mixes to give physical properties of both woodflour and Lyquaface. Compound permits the use of one carbonaceous material to obtain the properties of several. *Whitehead Brothers Co.*

For more facts, circle No. 289 on card

Strain Gauges

Bulletin S-E 3-55, lists the domestic price list of SR-4 Strain Gauges Instruments and Accessories. Includes diagrams and descriptions of many of the standard and special gauges and other vital information. *Baldwin-Lima-Hamilton Corp.*

For more facts, circle No. 291 on card

Die Casting Machine

New bulletin describes the Model No. 200 Cleveland Die Casting Machine. Points out how the hot metal end for magnesium, aluminum, bronze or brass alloys can be replaced by hot metal end for zinc, tin or lead alloys. *Cleveland Automatic Machine Co.*

For more facts, circle No. 293 on card

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BUSINESS REPLY CARD

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Reader Service Dept.

AMERICAN FOUNDRYMAN

Golf & Wolf Roads

Des Plaines, Illinois

Boron Aluminum

The April issue of *Better Castings*, Vol. XXV, No. 4, includes instructions for the addition of "Falls" Boron Aluminum. Procedure for introducing the boron is to stir in the 1 per cent boron aluminum before fluxing and pouring. *Niagara Falls Smelting & Refining Div.*

For more facts, circle No. 294 on card

Identification Guide

New identification guide for Permanent Refractories has been prepared. Guide shows colors that identify the various types of basic refractory brick produced and lists sacked ramming mixes, bonding mortars and furnace grains. *Kaiser Aluminum & Chemical Corp.*

For more facts, circle No. 295 on card

Welcome Folder

New "Welcome To" folder has been prepared by an independent research, development and testing laboratory. Folder answers 12 of the most common questions that enter the minds of clients and prospects—"What do we do," "In what fields," and "Where." *Sam Tour & Co., Inc.*

For more facts, circle No. 296 on card

Shell Machines

Bulletin CS-15 describes the Universal "Bio-Core" Shell Machine. Explains such features as: two station rotary operation, automatic recharging device, "no-leak" blow nozzles, adjustable tilting mechanism, and mechanical air operation. *C & S Products Co.*

For more facts, circle No. 297 on p. 56

continued on page 50

Reader Service Dept. **5515**

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NAME _____ TITLE _____

COMPANY _____

ADDRESS _____ CITY AND ZONE _____

EVIDENCE OF EXPERIENCE

On Our 10th Anniversary

We would like to thank the Foundry Industry for its confidence...

We would like to thank all of our clients for the opportunities and privileges to work with them to modernize their methods and facilities and to design complete new, up-to-date plants.

We also appreciate the opportunity to successfully apply automation to a number of different types of foundry products—and to assist management to establish more economical procedures for the control of operations and costs.

The next 10 years will see even more important developments in the foundry industry—metallurgically and technologically. We look forward to playing a small part in making the foundry a better place to work and in making it possible to insure an adequate return for workers, management, and owners.

Knight Engineers have completed more than 500 successful assignments in such fields as:

Foundry Engineering
•
Architectural Engineering
•
Construction Management
•
Organization
•
Management
•
Industrial Engineering
•
Wage Incentives
•
Cost Control
•
Standard Costs
•
Flexible Budgeting
•
Production Control
•
Modernization
•
Mechanization
•
Methods
•
Materials Handling
•
Automation
•
Surveys

On May 1st, the Knight organization will move to its new offices in the Knight Building, 549 West Randolph Street, Chicago 6, Illinois

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

549 W. Randolph St., Chicago 6, Ill.

917 Fifteenth St., N. W., Washington, D. C.

New York Office—Lester B. Knight & Associates, 50 Church St., New York City 7

Free Foundry Information

continued on page 48

Fill out postcards on pages 47-48 for complete information on items listed on pages 14 - 15 - 22 - 26 - 28 - 30 - 34 - 36 - 39 - 40 - 42 - 44 - 46 - 47 - 48 - 50

Molybdenum Disulfide Powder

Bulletin describes the purity, particle size, stability, chemical and thermal resistance and uses of McLube MoS_2-100, a submicronized and stabilized molybdenum disulfide powder. Points out how powder can be used in a moisture-free atmosphere. *McGee Chemical Co.*

For more facts, circle No. 298 on p. 56

Flaw Location

"Flaw Location by Dye Penetrants" is the title of a booklet recently issued. The 12-page book describes in detail the Turco Dy-Check inspection method and offers helpful suggestions on how to perform inspections on any metal by the dye penetrant method. *Turco Products, Inc.*

For more facts, circle No. 304 on p. 56

Hydraulic Standards

New revised up-to-date issue of the J.I.C. Hydraulic Standards for Industrial Equipment is now available. Included are recommended practices on hydraulic packings and seals, examples of packing code identification, sample circuit using J.I.C. symbols and glossary of terms. *Miller Fluid Power Co.*

For more facts, circle No. 308 on p. 56

Snagging Grinders

Bulletin MP-11 tells the story of Sad Sam who works in a grinding room with an old machine that had its best days about the time Woodrow Wilson was inaugurated. He points out savings to be realized with Infinitely Variable Grinder. *Standard Electrical Tool Co.*

For more facts, circle No. 299 on p. 56

Reprints and Bibliographies

Reprints and bibliographies listed below have been made available by the AFS Technical Dept. or by AMERICAN FOUNDRYMAN. Ask for them by giving code designation on dotted line of postpaid Reader Service Card, pages 47-48.

RB1 . . *"Casting Design"*
RB2 . . *"Gating and Risering"*
RB3 . . *"AFS Research"* (lists 58 papers)
RB4 . . *"Nondestructive Testing"*
RB5 . . *"Machinability"*
RB6 . . *"Casting Defects"*
RB7 . . *"Foundry Layouts"*
RB8 . . *"Shell Molding"*
RB9 . . *"Basic Cupola"*
RB10 . . *"Foundry Sand Practice"*
RB11 . . *"Welding of Cast Metals and "Salvaging"*

Dry Lubricating Film

Bulletin 102, a two-page, two-color circular, describes in detail Moly-Spray-Kote, a carefully-compounded dispersion of micro-fine molybdenum disulfide in a self-pressurized aerosol-type sprayer. Functions of this new dry lubricating film and its advantages in industry are explained. *Alpha Corp.*

For more facts, circle No. 309 on p. 56

Iron Phosphating on Steel

Booklet 9475, "How to Apply Iron Phosphate Coatings to Steel in Preparation for Painting," points out that the selection of iron or zinc phosphate treatments depends upon the purpose for which the article is intended. Includes diagrams, drawings, plant photos. *Oakite Products.*

For more facts, circle No. 300 on p. 56

Electronic Core Baking

Corebaking News, published by the Girdler Co., Thermex Div., points out how foundries, large and small, are cutting costs, boosting product quality and improving working conditions with Thermex core baking apparatus. *Girdler Co., Thermex Div.*

For more facts, circle No. 310 on p. 56

Foundry Ovens

Bulletin No. 1152 describes foundry ovens with maximum air recirculation horizontally. Well-illustrated folder covers car or rack ovens, roller drawer ovens and conveyor core ovens. Lists eight advantages of Moco Foundry Ovens. Includes diagrams. *Michigan Oven Co.*

For more facts, circle No. 301 on p. 56

Protective Coatings

Catalog 100 pertaining to Para-Products, covers protective coatings, compounds, penetrants and specialized products for foundry, industrial and commercial use. Moistureproof core and mold surface conditioners, finisher for patterns and core boxes, included. *Foundry Rubber, Inc.*

For more facts, circle No. 305 on p. 56

Hydraulic Cylinder Data

Power cylinder Bulletin H-104K contains latest, up-to-date data on Miller Fluid Power Company's complete line of heavy duty, 2000 psi high pressure hydraulic cylinders in 1½ in. through 12 in. bores, up to 22-ft strokes and 19 different mounting styles. *Miller Fluid Power Co.*

For more facts, circle No. 311 on p. 56

Chain and Slings

Bulletin AA covers the McKay-U-Loy Chain and Sling. Gives complete details on the uses, properties and advantages of this double-U welded chain made from high alloy steels in material diameters up to 2 in. Charts indicate attachments to use and loads to be lifted. *McKay Co.*

For more facts, circle No. 302 on p. 56

Electrolytic Etching

The second issue of the AB Metal Digest features the Micromet Etcher. Complete unit is housed in a modern assembly finished in silver gray hammertone. Equipped with twin-type 0-5 volt D.C. voltmeter, and a double scaled ammeter shunted for 0-100 ma D.C. *Buehler, Ltd.*

For more facts, circle No. 306 on p. 56

Overhead Crane

Unit 80, *"Presenting Whiting Engineered Cranes,"* offers a complete presentation of the wide variety of handling jobs being performed by Whiting overhead cranes. Installation photographs show cranes in foundries, power plants, and steel mills. *Whiting Corp.*

For more facts, circle No. 312 on p. 56

Magnesia Ramming Mix

Bulletin D-101, *"Ramset—New and Unusual Applications,"* discusses in limited detail new uses of this unique magnesia ramming mix, designed for original bottom construction and maintenance of open hearth and electric steel producing furnaces. *Basic Refractories, Inc.*

For more facts, circle No. 303 on p. 56

Platform Truck

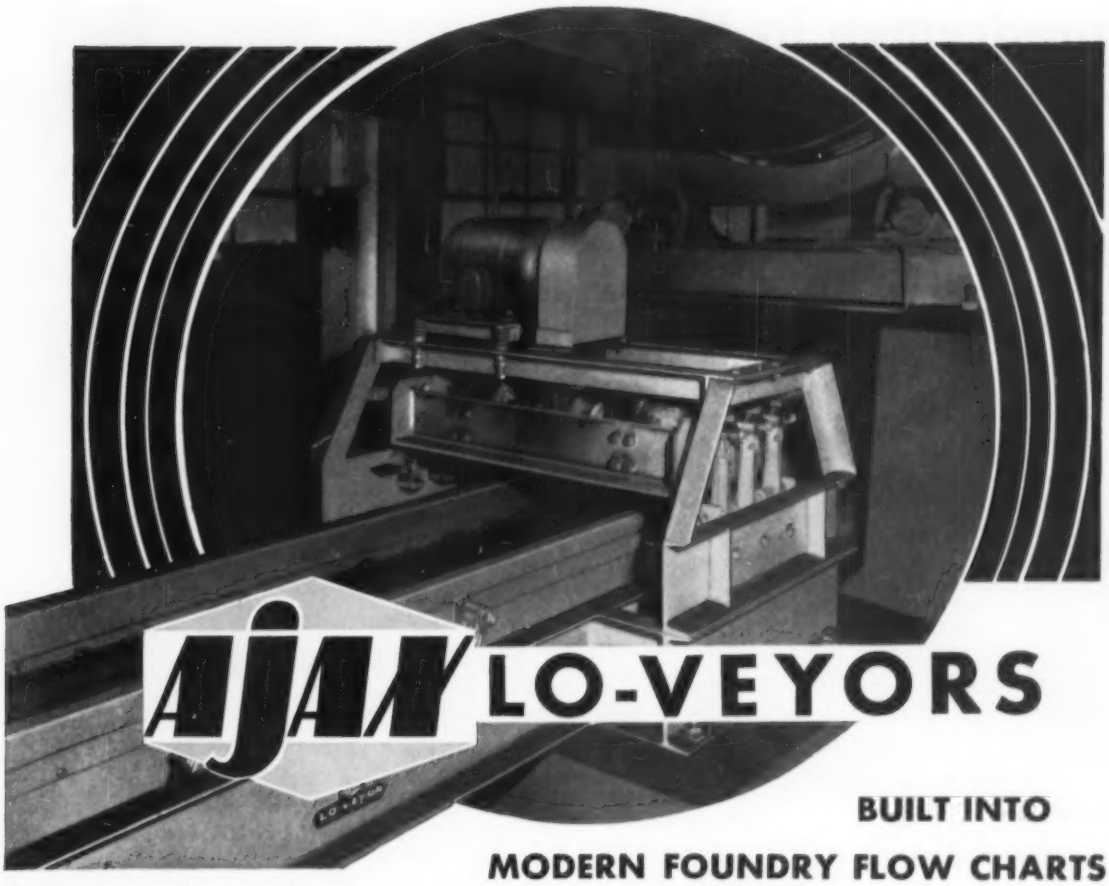
Bulletin ED-25 covers the Worksaver Platform Truck M7½. Specifications are given concerning the 7500 lb capacity Worksaver Lowlift Platform Truck. Model is manufactured in 4000, 6000 and 7500 lb capacities. Heaviest capacity truck achieves its strength thorough a reinforced frame. *Yale & Towne Mfg. Co.*

For more facts, circle No. 307 on p. 56

Precision Cleaning

Precision cleaning and finishing is the subject of a comprehensive new brochure just published. Dealing with the wet abrasive blasting process, the 18-page booklet presents 40 frequently-met applications. *American Wheelabrator & Equipment Corp.*

For more facts, circle No. 313 on card



AJAX LO-VEYORS

BUILT INTO MODERN FOUNDRY FLOW CHARTS

Ajax Lo-Veyor combination scalping screen and conveyor used in conjunction with sand reclamation system in new automotive foundry.

Take a trip through modern or modernized foundries and you will see how foundrymen are using Ajax Lo-Veyors to shake out high non-productive sand handling costs Foundry profits are based on tonnage of castings, not tonnage of sand. It is a fact that America's newest foundries are being equipped with Ajax Lo-Veyors from beginning to end.

Today, one of the surest and most economical ways to make substantial savings is to cut sand handling costs. Ajax Lo-Veyors not only convey but separate and screen foundry sand, tramp iron and core wires. Ajax Lo-Veyors are made in a wide range of lengths, widths and capacities to fit every condition. They pay for themselves over and over again in captive and custom foundries, and case histories prove it. Write now for Ajax Lo-Veyor Bulletin 39.

Ajax Lo-Veyors are perfectly simple and simply perfect for foundry conditions. Elimination of exposed bearings reduces maintenance costs particularly under foundry conditions where abrasive sand is constantly encountered. Drive unit is completely enclosed and operates in oil. Take advantage of Ajax specialized but broad experience in designing and building vibrating conveyors for foundry use.

AJAX FLEXIBLE COUPLING CO. INC.

Representatives in Principal Cities

WESTFIELD, N. Y.

Foundrymen in the News

William A. Morley has been appointed general superintendent of Link-Belt's Philadelphia plant at 2045 W. Hunting Park Ave. Mr. Morley has been with Link-Belt since 1929. In his new post he will supervise over-all production, including that of the Olney foundry. **Charles W. Mooney** was appointed superintendent of Olney foundry, the position previously held by Mr. Morley. Mr. Mooney joined Link-Belt at the Olney foundry in 1934. **Dwight H. Renfrew** has been appointed chief engineer of the company's Philadelphia plant. Mr. Renfrew has been with Link-Belt since 1929, and previous to his promotion was general superintendent of the Philadelphia operations.

Lester Lemma has been elected president of the board of directors of Belvidere Foundry, Inc., Belvidere, Ill. Others elected include: **Richard L. Olson,** vice-president; **August Lambrecht,** treasurer; **Zack T. Ritsos,** secretary; and **Frank A. Myers,** assistant secretary and treasurer. **L. C. Huff, J. P. Cornelison,** and **Ben Sandeen** are also members of the board.

Bernard N. Ames has been named vice-president of Columbian Bronze Corp., Freeport, Long Island, N. Y. For the past year and a half he has been general manager of Doran Manganese Bronze Co., Inc., Freeport, L. I., a subsidiary of Columbian Bronze.

Kenneth A. DeLonge has been placed in charge of the iron and non-ferrous castings section of the Development and Research Div. of International Nickel Co., Inc. Mr. DeLonge has been with International Nickel since 1937.

Victor M. Rowell, formerly a sales engineer with the Foundry Products Div., Archer-Daniels-Midland Co., Cleveland, has been appointed executive vice-president of Harry W. Dietert Co., Detroit. Before joining Archer-Daniels-Midland in 1951, Mr. Rowell was with Kordell Industries, spent nine years in Buick Motor Division's foundry, and was a technical sales representative with Velsicol Corporation's Core Oil Dept. for three years. Mr. Rowell is a member of the following committees of the Sand Div. of AFS: Executive, Flowability, Castings Defects Revision, Basic Concepts, and Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures. Mr. Rowell is also a charter member of the Cope and Drag Club.

Robert A. Willey joined the staff of Steel Founders' Society of America on March 1 as assistant technical and research director. Mr. Willey came to the Society directly from Commercial Steel Casting Co., Marion, Ohio, where he was chief metallurgist. Mr. Willey has been a member of S.F.S.A. Technical Research Committee since 1950. He is also a director of the Acid Open Hearth Research Association, and has served a two-year term as a member of the Papers and Program Committee of American Foundrymen's Society. His experience encompasses the field of chemical analysis, sand, composition control, radiography, heat treating, welding materials and techniques, specifications, gating, and open hearth melting of steel.

James G. Dick has been appointed district manager of Montreal Bronze Ltd., Montreal, Canada.

David E. Neustadt has been named general sales manager of W. W. Sly Manufacturing Co., Cleveland.

John W. Stevens has been named vice-president in charge of sales of Reichhold Chemicals, Inc.

Maurice K. Heartfield has been elected chairman of the board of Foundry Rubber, Inc. **John A. Sterrett** and **J. Douglas Rollow** will continue with the company as president and executive vice-president respectively. **Maurice K. Heartfield, Jr.,** formerly of the sales department of Olin Mathieson Chemical Corp., becomes vice-president in charge of sales.

W. A. Morley . . . gen. supt.

C. W. Mooney . . . fdry. supt.

Frederick Farnow, manager of the San Francisco plant of Federated Metals Div., American Smelting and Refining Co., has been appointed Pacific Coast manager of the Federated Metals Div.

O. A. Pfaff, president and general manager of American Wheelabrator & Equipment Corp., Mishawaka, Ind., was elected to the board of directors of Bell Aircraft

continued on page 54

K. A. DeLonge . . . section head

B. N. Ames . . . vice-president

V. M. Rowell . . . joins Dietert

R. A. Willey . . . with S.F.S.A.

FIND THE CAUSE OF CRACKS

and you'll cut the COST of castings

With the black light of Magnaflux-Magnaglo, you can give a low cost check to each production step to find WHERE and WHY invisible cracks are being "built-in" your castings.

A high percentage of cracked castings doesn't just happen—there's always a reason. It may be in pouring, sprueing, shake-out, cleaning, handling, grinding or heat treating—even shipping.

But which step is at fault? why?

By answering these questions, non-destructive inspection with Magnaflux* can help you SAVE MONEY. By sample checking of the output from each production step, Magnaflux shows where the cracks *first* appear, helps you to find the faulty operation or process and suggests the remedy. Correction often involves only a minor change in production techniques. Result: production runs with almost no cracks.

How much you can save with Magnaflux naturally depends somewhat upon your own operation. In practically every case Magnaflux can help you to turn out better castings *at greater profit per casting.* Ask to have a Magnaflux engineer give you the facts and figures! They're interesting and enlightening! Set the date now!

*Magnaflux is a registered trademark of the Magnaflux Corporation.

MAGNAFLUX

MAGNAFLUX CORPORATION
7352 West Lawrence Ave. • Chicago 31, Ill.

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 19 • Los Angeles 58

IMPROPER HANDLING CAUSED THIS CRACK
White line on bell-end casting for an electric motor is a Magnaglo indication of a crack. Sampling inspection with Magnaflux showed handling methods were consistently causing this crack. With the cause located, correction was simple — production of sound castings increased.

W. C. Cheek . . . asst. supt.

R. C. Robinson . . . standards

C. E. Foutel . . . spec. assign.

G. P. Street . . . RR director

continued from page 52

Corp., Buffalo, N. Y. American Wheelabrator, a manufacturer of blast cleaning machinery, abrasives, and dust and fume control equipment, has been affiliated with Bell Aircraft Corp. since June 1954.

Gordon P. Street, president, Wheland Co., Chattanooga, Tenn., was elected a director of Cincinnati, New Orleans and Texas Pacific Railway Co., one of the lines in the Southern Railway System.

E. L. A. Whitaker will be general manager of the new Canadian subsidiary of Simplicity Engineering Co., Durand, Mich. The new firm, Simplicity Materials Handling Ltd., will be at Guelph, Ont.

Flavel Nelms has been appointed district manager for all of Tennessee with headquarters in Nashville for Syntron Cincinnati Sales Co.

William C. Cheek has been promoted to assistant superintendent of process engineering for Central Foundry Div., General Motors. **Robert C. Robinson** has been promoted to superintendent of standards and methods, and **Charles E. Fousel** has been promoted to a superintendency in which he will be responsible for a special assignment.

Thomas Herald has been named vice-president of Syntron Buffalo Sales Co. Mr. Herald has been with the Syntron Pittsburgh Sales Co. since 1946.

Dallas M. Marsh has been promoted to assistant foundry superintendent of Cooper-Bessemer Corp., Mount Vernon, Ohio. A foundry engineer, Mr. Marsh has been closely associated with Cooper-Bessemer's research and development work with high strength gray iron and nodular irons used in the production of heavy internal combustion engines and compressors.

Floyd V. Snodgrass has been elected vice-president in charge of production of Walworth Co. Mr. Snodgrass has been identified with the machinery and machine tool industries for more than 30 years, principally in the San Francisco Bay area.

A. Donald Moll recently joined Minneapolis Electric Steel Castings Co., Minneapolis, Minn., as sales engineer. He was previously associated with American Manganese Steel Div. of American Brake Shoe Co., Union Carbide and Carbon Co., and Lake Erie Engineering Corp.

Vincent E. Lysaght has been appointed general sales manager of American Chain & Cable Co., Inc. He was formerly divisional manager of Helicoid, Campbell Machine and Wilson divisions of American Chain & Cable. His headquarters will now be at 230 Park Ave., New York.

H. V. King, formerly of the Chicago Wheelco Instruments Div. office of Barber-Colman Co., is now with the Philadelphia office, and **Harold Sieber** of Philadelphia has joined the service organization. **C. Combellack,** formerly associated with the Detroit Wheelco office, is now located at the Atlanta, Ga., office, and **Henry Hoffman,** who was recently with the Cleveland branch office, has been given the responsibility of managing the new Wheelco Columbus, Ohio, office.

Ralph W. Bailey has been appointed sales manager of the Continuous-Cast Products Dept. of American Smelting and Refining Co., New York.

Fred J. Walls, International Nickel Co., Inc., Detroit, has been named industrial advisor to the University of Michigan Student Chapter of the American Foundrymen's Society.

George E. Farren has been appointed field engineer and assigned to the Hartford, Conn., district office of the Norton Co.

Rear Admiral Wilson D. Leggett, Jr., USN, chief of the Navy's Bureau of Ships, has been appointed vice-president of engineering of American Locomotive Co. Admiral Leggett's appointment became effective upon his retirement from the Navy on March 31.

W. C. Hillman, Jr., has been appointed manager of coke sales of Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

Vincent A. Syriac, former sales manager of Springfield Cast Products, Inc., has joined the sales force of Kindt-Collins Co., Cleveland, Ohio. He will service the

continued on page 158

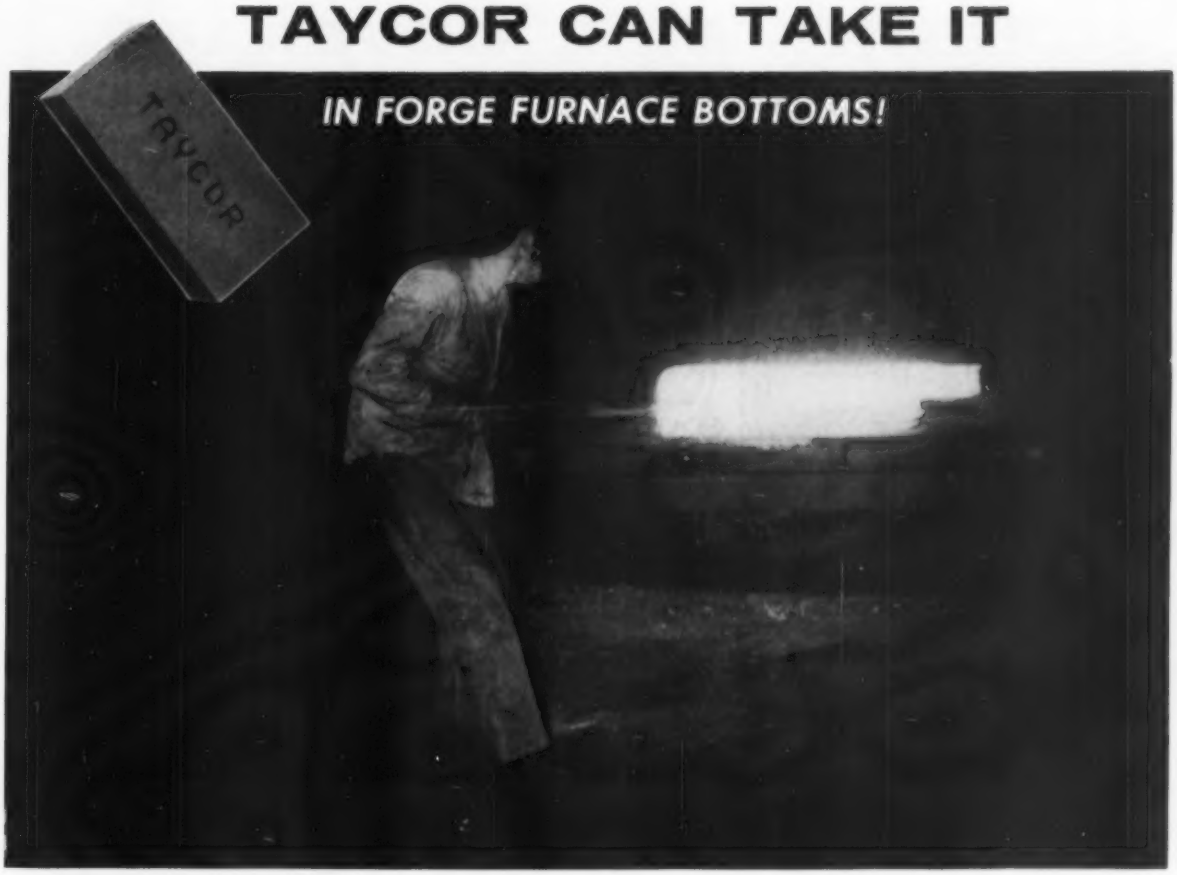
E. L. A. Whitaker . . . gen. mgr.

D. M. Marsh . . . asst. fdry. supt.

A. D. Moll . . . sales engineer

F. V. Snodgrass . . . prod. veep

TAYCOR CAN TAKE IT



TAYCOR brick bottom still going strong after 1½ years where fireclay fails in from 1 to 8 months!

The forge furnace shown above is one of many operated by a prominent manufacturer of forgings in the Chicago area. Steel pieces, weighing from 50 to 450 lbs., are pushed onto the furnace bottom and are withdrawn the same way. Due to this severe service, fireclay bottom life averaged from one to eight months.

Because of their excellent resistance to heat, abrasion and attack from iron oxide, TAYCOR Brick were installed in this furnace bottom. After more than 1½ years, the TAYCOR bottom was *still in good condition*. There was no grooving—the wear was even throughout—attesting to the abrasion resistance of TAYCOR. As a result, this customer has installed TAYCOR in other furnace hearths.

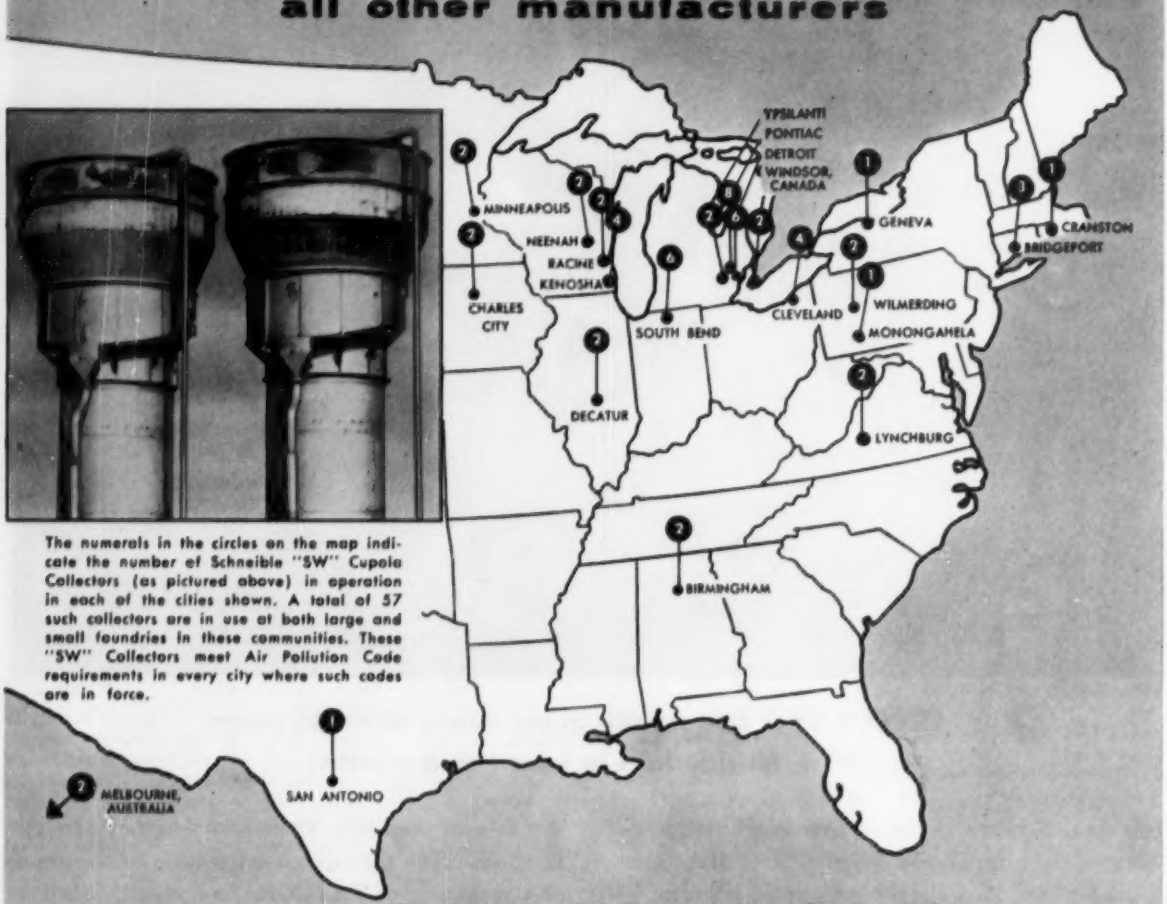
TAYCOR is The Chas. Taylor Sons Co. trade name for a complete line of corundum-base (alumina) super-refractories. It will pay you to look into the advantages of TAYCOR for similar applications. Contact the Taylor Field Engineer in your area, or write direct for full details.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Hamilton and Montreal

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
REFRACTORIES SINCE 1864 • CINCINNATI • OHIO • U.S.A.

INDUSTRY-WIDE COVERAGE..

there are more "SW" Cupola Collectors in operation today than those of all other manufacturers



The numerals in the circles on the map indicate the number of Schneible "SW" Cupola Collectors (as pictured above) in operation in each of the cities shown. A total of 57 such collectors are in use at both large and small foundries in these communities. These "SW" Collectors meet Air Pollution Code requirements in every city where such codes are in force.

Schneible is America's largest producer of wet method Cupola Collectors for the foundry industry.

For twenty years foundrymen and Schneible engineers have worked hand-in-hand to devise better, more efficient methods of controlling air pollution in the industry.

One of the outgrowths of this close cooperation is the "SW" Cupola Collector which has proven to be by far, the simplest, most economical and efficient collector ever designed for control of Cupola fly-ash and fumes.

Foundrymen in every important industrial center of the country look to Schneible for dust and fume control equipment that gives outstanding performance year after year with minimum maintenance.

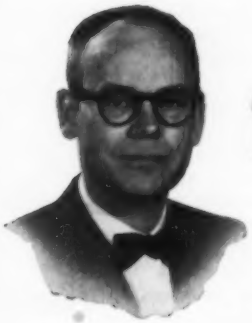
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

All Schneible Equipment is covered by patents in United States and foreign countries.

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan
Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

SCHNEIBLE

For more facts, circle No. 441 on postage-free Reader Service card on p. 47 or 48



Talk of the Industry

THROWING, pottery and ceramic industry technique that influenced the originator of shell molding in developing a method for applying sand-resin mixture to the pattern, sometimes creates a mold condition similar to a ram-off. Difficulty of applying the mixture vertically to the plane of the pattern plate is the cause. Another problem is air turbulence created when the mass of sand drops onto the pattern. Vents drilled along edge of dump box have helped overcome this; coated sands have avoided segregation that might otherwise result. Solution to both seems to have been discovered by a foundry which sprinkles the sand-resin mixture onto the hot pattern until the desired shell thickness is achieved. Result: better shells and no need to return excess sand to the dump box.

GRINDING WHEELS become more and more susceptible to breakage as they become smaller (hence weaker), while their rotational velocity is increased to maintain high peripheral speed for maximum metal removal. Developed to combat this is a new type of molded wheel and safety flanges that grip the wheel and key into grooves to hold segments that may try to break away. In tests, 14 x 2 x 6 wheels were deliberately broken in half, then reassembled with safety flanges and run up to 2000 rpm in a speed testing machine (1750 rpm is normal) before they flew apart. Wheels used are known as low-speed, vitrified bonded. In actual use, vibration would indicate wheel had broken and should be replaced immediately before damage or injury resulted. If cracked before mounting, ring test would disclose wheel should be discarded.

HOLLOW OR BOX CONSTRUCTION points up a new trend in market development and improved competitive position of castings. One American foundryman has developed thin-walled aircraft castings with a box-like cross section. Another reports tremendous success with a hollow, cast front axle for trucks. In Germany the new Taunus M15 auto, produced by a Ford subsidiary, has a cast, hollow crankshaft said to be stiffer, lighter, and more economical to produce.

PIGGY BACK freight handling (two semi-trailers per flat car), which eastern railroads are playing up as a new service, has been going on for some 20 years according to a Midwest trucker. Regardless of who's right, the practice should expand the market for railroad castings, one of the country's leading foundrymen indicates.

SILENCE reigns again in the vicinity of A-1 Steel & Iron Foundry, Vancouver, B. C. It's due to a residential neighbor not shouting through a megaphone from his new home as he has the past three years. He has been restrained by court injunction because his broadcasts endangered A-1 employees at pouring time. Among many comments, the neighbor expressed the fond hope that the foundry would burn down. Another clear-cut recognition that industry has some rights where

residential neighbors are concerned! Previously reported by AMERICAN FOUNDRYMAN is the development in Ohio, spearheaded by International Harvester Co., of an area zoned for industry and against residential use.

STAND BACK while we blow out the candles! AMERICAN FOUNDRYMAN is celebrating an anniversary in a modest way. Ten years ago, "The Foundrymen's OWN Magazine" discarded its knee breeches and "grew up" as a full-fledged technical journal. The magazine has continued to advance ever since and, as it enters its second decade of service to the industry, will offer even more in the way of "how to do it" and "what to do it with." You can expect great things from the AFS magazine in 1955 . . . watch and see!

SMOG in Los Angeles area is under scrutiny by an automatic photoelectric instrument developed by the National Bureau of Standards. Selective ultraviolet absorption by ozone in a 1500-ft light beam will detect minute quantities of the gas, one of several to which smog difficulties are attributed.

PRODUCTION TECHNOLOGY course leading to BS degree at Oregon State College appears to fill a rapidly growing void brought on by educational trend toward de-emphasis of process technology. Most deans lean toward nuclear physics and the like today. That industry is willing to pay to have the schools do part of the job many deans say industry should do is indicated by the fact that OSC can't begin to meet the demand for production technology graduates, most of whom go east. The 4-year course emphasizes manufacturing processes (naturally it includes castings production), includes many industrial engineering courses, industrial psychology, accounting, business administration, and metallurgy, with option of taking advanced metallurgy.

HOT TEARING susceptibility of steel castings is influenced most strongly by core hardness, while next most significant factor is deoxidation practice according to a report issued by the Steel Research Committee of the American Foundrymen's Society. Variation in chemistry within Grade B specifications did not contribute to hot tearing, nor was any correlation with pouring temperature or pouring time found. Microstructure, as well as inclusion count and type did not correlate with hot tears in this study.

MICA STRAINER CORES, in vogue in some West Coast foundries, simplify storage and handling. Users (gray iron, copper-base, aluminum) report no mica inclusions, no breakage, and of course, no sand inclusions from friable strainer cores, no iron pickup sometimes troublesome in aluminum alloys. Mica strainers (more properly, chokes) create no problems in remelting gates Western castings producers say.

RIPPER was a natural for conversion from welded to cast construction by Los Angeles Steel Casting Co. Mounted on the side or the drawbar of a "cat", a ripper is used to loosen tough western caliche or any other obstacle to easy bulldozing in construction work. Castings, chrome-nickel-molybdenum steel, consist of an adapter bracket for mounting, a box-like cage that holds the ripper shank, a tooth that does the ripping, a spur that catches into the ground first to make the tooth dig in, and some adjusting and connecting pins. Not a service failure since converting to castings.

Herbert P. Scobie

Make shell molds faster...
get more accurate castings...
with RCI's

FOUNDREZ 7500

• You save — in *time*, in *labor*, in *materials* — when you make shell-molds with Reichhold's two-stage, thermosetting, powdered phenolic resin — FOUNDREZ 7500. You get castings so accurate that almost no machining is required . . . closely duplicating the actual pattern surface even in the most finely-detailed, thin-walled areas. Rejects are reduced to an absolute minimum.

When you produce shell-molds with FOUNDREZ 7500, curing is *faster*. This remarkable RCI resin takes extremely high oven temperatures, enabling you to turn out more molds per hour . . . molds of uniform superiority. They're structurally stronger, better able to vent gas, freer from distortion.

For large and small parts cast with any ferrous or non-ferrous material, shell-molding with FOUNDREZ 7500 is ideal, particularly for long production runs. RCI offers technical help. Get complete data by writing for Technical Bulletin F-3.

RCI

Creative Chemistry . . .
Your Partner
in Progress

The foundryman unclamps the pattern plate from the dump box. Notice the thin shell of partially-cured FOUNDREZ 7500 and sand clinging to the plate.

REICHHOLD

Synthetic Resins • Chemical Colors • Plasticizers • Phenol
Glycerine • Phthalic Anhydride • Maleic Anhydride • Sodium Sulfate
Sodium Sulfite • Pentaerythritol • Pentachlorophenol

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

59th AFS Convention

HOUSTON
MAY 23-27
1955

AMERICAN FOUNDRYMEN'S SOCIETY

FOR THE FIRST TIME in the history of the Society, the 59th AFS Castings Congress will be held in the South, in Houston, Texas, May 23-27. Visiting foundrymen will receive a traditional Texas welcome and the Host Chapter has prepared a most unusual program, culminating in "Texas Chapter Night."

Heavy attendance by management, metallurgists, engineers, technologists, educators, research men and working foundrymen is expected as a result of the excellent program being offered.

Keener competition and the desire to produce a better product at lower cost have dictated a Convention program slanted toward subjects of management interest, such as costs and industrial management. Emphasis has also been placed on practicality as well as the broadest possible coverage of the latest technological developments in the foundry industry.

More than 100 technical papers will be presented by leading foundrymen at some 40 separate sessions. International papers have been received covering the new die pressing process for gray iron and sand testing techniques. A film from Germany depicting the carbon dioxide process for hardening cores and molds will also be offered.

Other sessions will feature research reports on AFS projects. In addition, a series of shop courses have again been scheduled; nine round-table luncheons are on the program. The shop courses, open to all, are intended primarily for discussion of essentially a practical nature.

All sessions have been scheduled for the convenience of foundrymen by grouping those in a given field of interest, thus enabling Convention-goers to attend the greatest number of meetings in the shortest possible time.

General Interest Events

Throughout the Convention, frequent traditional meetings and social gatherings have been arranged, as well as a program of entertainment for the ladies, prepared by the Texas Chapter.

The traditional President's Reception (invitational) will be held at the Shamrock Hotel, Sunday evening, in honor of the Texas Chapter officers, directors and committee chairmen. Program for the ladies includes a delightful launch trip on the Houston ship channel, and a luncheon and style show.

Plant visitations, always an interesting part of every AFS Convention, have been arranged by a local Plant Visitation Committee and foundrymen will be able to plan visits during Convention Week, as well as enroute to and from Houston. Map showing locations of foundries throughout Texas appears on page 82 of this issue.

Breakfast meetings of authors and session officials have been arranged for Monday, Tuesday and Wednesday mornings. Purpose is to maintain AFS program standards and to verify last minute details required for scheduled meetings.

Registration headquarters for foundrymen will be

set up at the Rice Hotel; for the ladies, at the Shamrock. Registration as a member or non-member is required for all sessions except the evening Shop Course meetings.

A publications booth, exhibiting more than sixty current AFS publications, will adjoin registration facilities at the Rice Hotel. On display will be four new sections of the ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT IN FOUNDRIES. Those sections cover: *"Hygiene Problems & Introduction on Principles of Foundry Ventilaton," "Exhaust Hoods and System Design," "Practical Design of Sand Handling Ventilation Systems,"* and *"Maintenance and Testing."*

Show New Books

A sample copy of the new PRINCIPLES OF METAL CASTING, scheduled for completion in the fall will be shown. Other publications exhibited will include: PROCESSING MOLDING SAND, THE CUPOLA AND ITS OPERATION, TIME AND MOTION STUDY FOR THE FOUNDRY, MELT QUALITY AND PRESSURE TIGHTNESS OF COPPER-BASE ALLOYS, and CONTROL OF EMISSIONS FROM METAL MELTING OPERATIONS.

The Annual AFS Business Meeting is set for the Rice Hotel ballroom, the morning of May 25. In addition to the President's Annual Address, Awards will be announced in the AFS Apprentice Contest, and newly elected officers and directors of the Society will be introduced. The Charles Edgar Hoyt Memorial Lecture by F. J. Walls, International Nickel Co., Inc., Detroit, will follow.

Houston is a city of modern buildings, beautiful parks

Wednesday evening brings the Annual AFS Banquet, to be served at the Shamrock Hotel, at which time presentations of AFS Gold Medals and Honorary Life Memberships will be made. President Frank J. Dost will preside. Hugh M. Comer, Avondale Mills, Sylacauga, Ala., will be guest speaker at the Banquet.

Thursday evening has been designated "Texas Chapter Night." A mounted drill by a 21-man "sheriff's posse," fast precision riding, and a torch-light number will be featured. A real old-fashioned Texas barbeque then will be served chuck wagon style.

Three air tours of Mexico have been scheduled especially for foundrymen and their ladies, following the Convention. Group 1 leaves Houston Sunday, May 29, at 3:30 pm via 66-passenger plane, arriving non-stop in Mexico City at 6:45 pm. Group 2 leaves Houston Monday, May 30, at 8 am, arriving in Mexico City at 1:15 pm; there are brief stops in Brownsville, Texas, and Tampico, Mexico. Group 3 leaves Houston Monday, May 30, at 3:30 pm, arriving non-stop in Mexico City at 6:45 pm. The nine-day tours will cost approximately $245, and include visits to key cities, art and cultural centers, and historic sites, a tour of Mexico City night clubs, a bull fight, and optional jungle and fishing trips. Details can be secured by writing E. R. Brown, Harvey Travel Bureau, 2005 West Gray Ave., Houston 19, or F. M. Wittlinger, Texas Electric Steel Casting Co., Houston. Other tours can be arranged with National Railways of Mexico through the San Antonio, Texas, office.

Meetings will be held in several leading Houston hotels

Following is a résumé of technical sessions grouped by industry and operation interest. Full details appear in the Official Program starting on page 68.

Gray Iron

The Gray Iron Division has meetings scheduled for every day of the Convention. Four technical sessions, plus a Round Table Luncheon and two Shops Courses, are planned.

Monday evening, 8 pm, at the first Shop Course meeting, the subject will be *"Practical Inoculation of Cupola Melted Irons."* All gray iron foundrymen will be interested in *"Efficient Cupola Operation,"* scheduled for the second Shop Course session Tuesday

evening. Discussion leader will be M. J. Henley, Tyler Pipe & Foundry Co., Tyler, Texas. A round table luncheon is set for Wednesday, at which William G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich., will speak on *"Success for Castings = Design + Quality."* Thursday morning three papers on ladle injection—*"Calcium Carbide Desulphurization by the Injection Process," "Increasing the Carbon Content of Cast Irons by Ladle Injection,"* and *"New High-Strength Cast Iron Produced by Injection Methods,"*—will be offered.

At 2 pm Thursday, the official exchange paper from the Institute of British Foundrymen, by R. S. M. Jeffrey, dealing with the new die pressing process and production of light castings will be presented. Casting utilization paper covering *"Machinability Testing—Relation Between Cutting Temperature and Tool Life for Gray Cast Irons"* and a progress report on *"Fluidization-Injection Process for Desulphurizing and Upgrading Cast Iron"* will also be heard at this session. The growing use and importance of ductile iron will be discussed at the 4 pm session Thursday. Friday morning's meeting has papers on the gating and risering of ductile iron.

Sand

Meetings sponsored by the Sand Division will be held each day with seven technical sessions, two shop course sessions and a dinner included.

F. J. Walls to Give Hoyt Memorial Lecture

F. J. Walls

"Education and the Future Foundryman," is the title of the Charles Edgar Hoyt Memorial Lecture to be presented by Fred J. Walls, in charge of the Detroit Technical Field Section of International Nickel Co. Mr. Walls will present his talk immediately following the Annual Business Meeting, Wednesday morning, May 25.

A past president of the American Foundrymen's Society, Mr. Walls was selected because of his long-standing interest in improving the quality level of foundry education, and his constant encouragement of young men to enter the metal castings industry. He has served as chairman or member of numerous committees of the Gray Iron and Education Divisions of the Society, and has contributed frequently to meetings of the foundry, engineering and metallurgical societies.

Born in Oakland County, Mich., he received his technical education at the University of Michigan, Ann Arbor, Mich., where he specialized in metallurgy. He has been associated with International Nickel since 1934.

General Sam Houston going into battle at San Jacinto

Again stressing management interest in cost reduction the first meeting Monday afternoon will concern raw material costs. A paper will be presented by S. C. Massari, Hansell-Elcock Co., Chicago. *"Fitting Sand Control to Individual Foundries,"* is the subject scheduled for the Shop Course Monday evening at 8 pm. A new core binder composed of dextrose and an inorganic salt catalyst will be explained at the Tuesday morning session.

Two authors on sand practices defend sand Tuesday afternoon, and point out how all defects cannot be attributed to conditions in the sand. Carbon dioxide process for hardening cores and molds, a relatively new method now being widely tested for practical application, will be covered at the Sand Division Dinner, Tuesday at 6 pm. Dr. Waldemar Schumacher of Bendorf am Rhein, Germany, through the courtesy of the German Foundrymen's Association (Verein Deutscher Giessereifachleute), will speak on the carbon dioxide process and, for the first time in this country, will show a film on the process. *"Sand Preparation Without Guess Work"* will be the subject of the Shop Course following the dinner at 8:30 pm. Panel will consist of William E. Patterson, Elkhart Foundry & Machine Co., and Jean Danenfelser, International Harvester Co., Indianapolis. A Swiss paper on sand test specimens by Walter Goetz, George Fischer, Ltd., Schaffhausen, Switzerland, will be presented at the Friday morning meeting at 9:30.

Light Metals

Two current topics on titanium alloys and shell molding of magnesium will be discussed at 2 pm, Monday. At 4 pm papers to be presented are: *"Application of Insulated Risers to Production of Aluminum Alloy Sand Castings"* and *"Measurement of Gas in Mol-*

continued on page 65

AFS Gold Medal Awards

John B. Caine

J. H. Whiting Gold Medal

Independent technical consultant to the foundry industry, Mr. Caine of Cincinnati has been pattern clerk, melter, foundry foreman, production manager, chemist, metallurgist, and director of research. A member of several technical societies, Mr. Caine is active in nine AFS technical committees (six in the Sand Div.) and has contributed many papers and spoken often on the behavior of foundry sands.

John Edward Rehder

Peter L. Simpson Gold Medal

Director of Technology and Research, Mr. Rehder organized metallurgical control, set up inspection, and generally supervises technical affairs of Canada Iron Foundries, Ltd. Mr. Rehder has been chief metallurgist and asst. manager of foundries and foundry engineer at the Canadian Dept. of Mines & Technical Surveys. He contributes frequently to American Foundryman, actively participates in AFS Educational and Malleable Div. work, and speaks on many foundry subjects. Much of his research has been in malleable.

Robert F. Thomson

John A. Penton Gold Medal

Mr. Thomson, head of the Metallurgy Dept., Research Laboratories Div., General Motors Corp., has been university instructor, foundry metallurgist, and engaged in research and development. He is active on committees of several engineering societies including AFS and F. E. F. and is co-author of eleven published papers. Mr. Thomson was chairman of the Aluminum & Magnesium Div. Research Committee of AFS which initiated and sponsored the research project at Battelle Memorial Institute on the hydromechanics of metal flow in molds.

J. H. Whiting Gold Medal

"For outstanding contributions to the Society and the industry, particularly in the field of foundry sand research and applications."

Peter L. Simpson Gold Medal

"For outstanding contributions to the Society and to foundry knowledge of cast metals."

John A. Penton Gold Medal

"For outstanding contributions to the Society and the industry in foundry research, particularly in the field of light metals."

ten Aluminum." The importance of the foundry to airplane manufacturers will be brought out at a Round Table Luncheon May 24, when a paper on "*Castings in Air-fame Design*" will be presented. Following the luncheon at 4 pm, two papers, "*Production of Aluminum Alloy Specifications Castings*" and "*A Case Study of a Premium Strength Casting*," are offered.

A new AFS-sponsored color-sound film on vertical gating systems will be shown at 2 pm Wednesday. Developed in cooperation with Battelle Memorial Institute and Frankford Arsenal, the film depicts procedures and techniques that enormously improved casting quality. Film is the fourth in a series of gating films, and the first on vertical gating.

Brass and Bronze

Including a Round Table Luncheon Monday, the Brass and Bronze Division will have four technical sessions and a Shop Course in its program. At the luncheon, W. A. Meissner, Business and Defense Services Administration, Washington, D. C., will speak on "*The Functions of the Copper Division, B.D.S.A.*" Molding and melting will be discussed at the afternoon meeting Monday. The Navy Department has

Honorary Life Members

Frank C. Riecks

"For outstanding contributions to the Society in the design and construction of the new AFS Headquarters Building."

Past-National Director of AFS Mr. Riecks, technical assistant to the manager of foundries, Ford Motor Co., with devoted interest, contributed time and effort to the drawing of plans and specifications of the AFS Headquarters Building. He thereupon kindly accepted the responsibility of being the owner's sole representative during building construction. In 38 years with Ford, Mr. Riecks has been instrumental in the construction of many facilities in the United States and several foreign countries.

Albert F. Pfeiffer

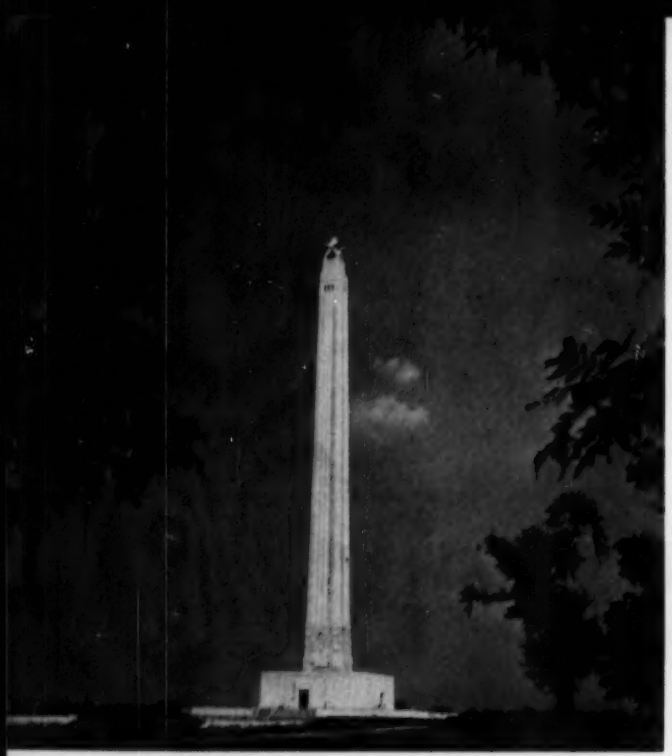
"For contributions to the Society, its Chapters, and the industry over many years; for better understanding of patterns and their importance in foundry work; and for his constant encouragement of young men to enter the industry."

Journeyman patternmaker Pfeiffer is superintendent of iron, malleable, steel, and non-ferrous pattern shops of Allis-Chalmers Mfg. Co. His service of 53 years began with apprenticeship. Past-President of the Wisconsin Chapter, Mr. Pfeiffer has held many chapter offices and is presently a director. He is active on three committees of the AFS Pattern Div. of which he is a past-chairman. Mr. Pfeiffer speaks on patternmaking and foundrywork to apprentices, trade school and college engineering and foundry students.

Frank J. Dost

"For outstanding service to the Society as President during the year 1954-55."

Mr. Dost, president of Sterling Foundry Co., has served the Society generously as president of the Northeastern Ohio Chapter, national director, vice-president, and president. Mr. Dost's foundry career began in 1926 as a University of Cincinnati student working on a cooperative program with a local machine tool foundry. He has written and spoken often on the manufacture and use of high-test alloy iron castings in machine tool construction.



San Jacinto Monument commemorates Texas independence

played an active part in contributing to the program with papers emanating from the Naval Research Laboratory, Mare Island Naval Shipyard, and the Bureau of Ships.

"Investigation of Precision Casting of Experimental Propellers" and *"Short-Time Elevated Temperature Properties of Three Copper-Base Casting Alloys"* will be discussed at the 2 pm meeting, Tuesday. At 4 pm, a paper on dimensional tolerances of shell-cast nonferrous metals, is scheduled. This should be of interest to all foundrymen.

Steel

One of the best steel programs in years is set for the last three days of the Convention, Wednesday, Thursday and Friday. Four technical meetings and a Round Table Luncheon are scheduled. Hot tears and ruptures will be covered at the 4 pm session Wednesday. Included will be a paper on hot tears from the British Steel Castings Research Association by J. M. Middleton. J. B. Caine, 1955 AFS gold medalist, will speak on *"A Metallographic Study of Ruptures in Steel Castings,"* at the meeting.

Design, engineering advantages, and the use of steel castings by railroads will be included in three papers of management interest bringing attention to industry of broadening markets. They will be presented at the Thursday morning session. A symposium on the production of quality steel castings, including four papers, is scheduled for the 3 pm session, Thursday.

At the Friday morning meeting, papers will cover riser dimensions, chill application and the new graphite-mold car wheel casting process.

Malleable

Three technical meetings, two Shop Courses and a Round Table Luncheon are scheduled for the Malleable Division, Monday and Tuesday. *"Effects of Trace Amounts of Tin, Lead and Antimony on Annealing of Blackheart Malleable Iron"* and *"Embrittlement, Toughening and Sub-Critical Thermal Treatment of Malleable Iron,"* are two papers to be given at the 10 am session Monday. B. C. Yearley, National Malleable & Steel Castings Co., Cleveland, will speak on *"Producing Solid Castings With Minimum Riser Cost"* at the luncheon Monday.

At the Shop Course slated for 4 pm, Monday, the discussion will be on pearlitic malleable. Discussion will cover producing pearlitic malleable iron including base iron, heat treatment, controls, finishing, and properties. Panel for the meeting will consist of R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.; C. F. Joseph, Central Foundry Div., G.M.C., Saginaw, Mich.; Milton Tilley, National Malleable & Steel Castings Co., Cleveland, and P. F. Ulmer, Link-Belt Co., Indianapolis.

Tuesday morning the AFS sponsored research project, *"Effects of Some Melting Variables on the Properties of Malleable Iron,"* and a paper on *"Metallurgical Controls for Duplexed Malleable,"* will be presented.

Industrial Engineering

The Industrial Engineering Committee will sponsor a technical meeting Tuesday at 2 pm and a Round Table Luncheon Wednesday noon. Foundry production standards and improving paperwork will be discussed at the Tuesday Session. Paper covering *"Your Hidden Fixed Costs and Their Effect on Profit and Loss"* by M. E. Annich, American Brake Shoe Co., Mahwah, N. J., will be presented at the luncheon.

Pattern

A Round Table Luncheon Wednesday and two technical sessions Thursday, at 9:30 am and 4 pm, are planned by the Pattern Division. Richard L. Olson, Dike-O-Seal, Inc., Chicago, will explain new methods of sealing core boxes against blow-by at the luncheon on Wednesday, and *"Wood Pattern Construction Standards and Specifications,"* will also be covered. *"Gypsum Cement Molds for Plastic Patterns"* and *"Research in the Patternmaking Industry"* are papers scheduled for Thursday morning and high pressure molding and zircon molds for patterns will be discussed at the afternoon session.

Plaster Mold Casting

Three papers will be presented at the Plaster Mold Session Monday at 10 am. Production of core boxes for metal casting plaster cores will be explained in one paper. Two other papers dealing with investment casting, *"Surface and Internal Bubble Control in Poured Investment Plasters,"* and *"Influence of Vibration on Fluidity and Filling During Investment Casting of an Aluminum Alloy,"* will also be offered.

Education

The direct relationship between industry and the AFS Educational Program at high school and vocational school level will be brought out at the Chapter Education Workshop session at 9:30 am, Tuesday. Panel at the session will consist of: A. C. Hensel, Albion Malleable Iron Co., Albion, Mich.; Frank C. Cech, Cleveland

Trade School, Cleveland; Ormond Requadt, Dow Chemical Co., Bay City, Mich., and R. A. Oster, Vocational and Adult School, Beloit, Wis. At the Round Table Luncheon Tuesday, Donald F. Lane, National Foreman's Institute, N. Y., will speak on *"In-Plant Training."*

Costs

The trend toward the importance of industrial management is indicated by the two papers to be presented at the Cost Session Monday at 2 pm. Papers cover modern management control and management's task under competition.

Safety, Hygiene & Air Pollution Control

Sessions will be held Tuesday, Wednesday and Thursday from 2 to 5 pm each day. The latest air pollution developments and the AFS air pollution manual will be discussed at the Tuesday meeting. A paper on the rate of dust emissions under hot and cold blast operations will also be offered.

The growing importance of noise control in the foundry is indicated by the first up-to-date panel to sit at the Wednesday session. Radiant heat, safe practices with x-rays and radioactive isotopes, and a new theory on the cause of grinding wheel failures will also be covered. All topics will dwell on control and improvement of environmental conditions. Thursday, the new AFS Manual, ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT IN FOUNDRIES, will be discussed. Two demonstrations will also be given, one on fan performance, the other on duct work efficiency.

Heat Transfer

Heat transfer sessions Wednesday and Thursday at 2 pm each day, have been designated the Dr. Harry A. Schwartz Memorial Forum on the Application of Heat Transfer Principles to Foundry Practice. W. K. Bock, National Malleable & Steel Castings Co., Cleveland, will make the dedication Wednesday. Four excellent papers to be presented following the dedication are: *"Solidification of Finite Cylinders," "Feeding Range in Shell Molds," "Heat Transfer Problems in Permanent Molds for Aluminum Castings,"* and the second part of *"The Risering of Nodular Iron—The Effect of Silicon Content on Feeding Distance."* (First part was presented at last year's Convention in Cleveland.)

At the second session Thursday *"Risering of Commercial Steel Castings"* will be presented by Charles W. Briggs, Steel Founders' Society of America, Cleveland.

Plant and Plant Equipment

Shell molding equipment and small foundry mechanization will be covered at the meeting at 4 pm, Thursday. Molding and melting equipment is also discussed at the Brass and Bronze Shop Course at 4 pm, Monday.

Refractories

Cost is again the theme at the 2 pm refractories meeting Wednesday. Subjects include *"Improving Refractory Cost in Malleable Melting,"* and *"Malleable Furnace Refractory Cost Reduction Program." "Forehearth Refractories for Soda Ash Desulphurizing"* and *"High-Duty, Super-Duty and High-Alumina Refractories in the Foundry"* are discussed at the Thursday meeting at 2 pm, and the Official Exchange Paper on *"Monolithic Converter Linings,"* from the Institute of British Foundrymen, Australian Branch (Victoria), by J. Davies, Messrs. Davies & Baird Pty., Ltd., Melbourne, Australia, will also be presented.

Non-Destructive Testing

A joint luncheon meeting with the Society for Nondestructive Testing and AFS has been arranged for Friday noon. *"Non-Destructive Testing As a Foundry Tool"* will be the subject of a talk at the meeting by H. J. Heine, AFS technical director. A Symposium on Non-Destructive Testing, will be held at 2 pm, following the luncheon. Seven papers are to be presented covering such subjects as *"Improved Casting Quality Through Non-Destructive Testing"* by Francis H. Hohn, *"Use of Cobalt 60 for Castings"* by Jewelle N. Ketchbaw, *"The Use of Radiography in the Non-Destructive Testing of Castings"* W. D. Kiehle, *"Magnetic Particle Inspection"* by Kermit Skeie, *"X-Ray and Gamma Radiography"* by J. K. Bell, *"Experimental Stress Analysis"* by Joe W. Beckham and *"Industrial Radiography,"* by T. Howard Rogers.

Sheriff's Posse entertains with precision mounted drill

Main Street is lined with stores and office buildings

AFS

CONVENTION PROGRAM

and program personalities

SUNDAY, MAY 22

5:30 pm **President's Reception**

MONDAY, MAY 23

8:00 am **Authors and Officers Breakfasts: Brass and Bronze Division; Malleable Division; Light Metals Division; Cost Committee; Plaster Mold Casting Committee**

9:00 am **Registration and Publications Display Open**

10:00 am **Brass and Bronze Session**

Presiding: W. H. Baer, Bureau of Ships, Navy Dept., Washington, D. C.

Co-Chairman: A. W. Bardeen, Ohio Brass Co., Mansfield, Ohio

Feeding of Castings, Thornton C. Bunch and George E. Dalbey, Mare Island Naval Shipyard Foundry, Vallejo, Calif.

(April issue)

Vapor Holes in Brass and Bronze Castings from Loose Sand Grains, W. B. George and Floyd Keller, R. Lavin & Sons, Inc., Chicago

10:00 am **Plaster Mold Session**

Presiding: Hyman Rosenthal, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia

Co-Chairman and Secretary: George R. Gardner, Aluminum Co. of America, Cleveland

(April issue)

The Production of Flexible-Faced Core Boxes for Metal Casting Plaster Cores, Robert F. Dalton, Hills-McCanna Co., Chicago

Surface and Internal Bubble Control in Poured Investment Plasters, Robert G. Megaw, United States Gypsum Co., Chicago

Influence of Vibration on Fluidity and Filling During Investment Casting of an Aluminum Alloy, D. W. Levinson, A. H. Murphy, and W. Rostoker, Armour Research Foundation, Chicago

10:00 am **Malleable Session**

Presiding: W. A. Kennedy, Grinnell Corp., Providence, R. I.

Co-Chairman and Secretary: W. M. Albrecht, Chain Belt Co., Milwaukee

(Preprint 55-63)

Effects of Trace Amounts of Tin, Lead, and Antimony on Annealing of Blackheart Malleable Iron, R. C. Shnay, Dept. of Mines and Technical Surveys, Ottawa, Ont., J. E. Wilson and J. E. Rehder, Canada Iron Foundries, Montreal, Que.

(Preprint 55-62)

Embrittlement, Toughening, and Sub-Critical Thermal Treatment of Malleable Iron, Gilbert E. Kempka, University of Wisconsin, Madison

12:00 noon **Brass and Bronze Round Table Luncheon**

Presiding: B. A. Miller, Crown Non-Ferrous Foundry, Chester, Pa.

Co-Chairman: H. L. Smith, Federated Metals Div., American Smelting & Refining Co., Hammond, Ind.

The Functions of the Copper Div., B.D.S.A. W. A. Meissner, Copper Div., Business & Defense Services Administration, Dept. of Commerce, Washington, D. C.

Round Table Discussion of Foundry Practices

12:00 noon Malleable Round Table Luncheon

Presiding: R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.

Producing Solid Castings with Minimum Cost for Feeders, B. C. Yearley, National Malleable & Steel Castings Co., Cleveland

2:00 pm Foundry Cost Session

Presiding: C. E. Westover, Westover Engineers, Milwaukee

Co-Chairman: William Busby, Texas Foundries, Lufkin, Texas

Modern Management Control, Roger K. Dailey, Lester B. Knight & Associates, Chicago

The Management Task in a Competitive Economy, L. L. Ellis, Booz, Allen & Hamilton, Chicago

2:00 pm Light Metals Session

Presiding: D. L. Colwell, Apex Smelting Co., Cleveland

Co-Chairman: W. A. Mader, Oberdorfer Foundries, Inc., Syracuse, N. Y.

Shell Molding of Magnesium Alloys, Nicholas Sheptak, Dow Chemical Co., Midland, Mich.

(Preprint 55-44)

Foundry Characteristics and Properties of the Magnesium Sand Casting Alloy HZ32XA, K. E. Nelson, Dow Chemical Co., Midland, Mich.

(Preprint 55-48)

Mechanical Properties of Cast Titanium-Silicon Alloys, H. W. Antes and R. E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia

2:00 pm Sand Session

Presiding: Victor M. Rowell, Harry W. Dietert Co., Detroit

Co-Chairman and Secretary: F. S. Brewster, Southgate Aluminum & Magnesium Co., Southgate, Cal.

(This issue)

General Motors Experimental Foundry, L. J. Pedicini, Process Development Section, General Motors Corp., Detroit

What Are Your Raw Material Costs? S. C. Massari, Hansell-Elcock Co., Chicago

4:00 pm Brass and Bronze Shop Course

Presiding: John G. Collier, Garrott Brass & Machine Co., Inc., Houston

Co-Chairman: John C. Calhoun, Dee Brass Foundry, Houston

Molding Equipment for the Brass Foundry, C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago

Melting Equipment for the Brass Foundry, Harold J. Roast, Ottawa, Ont.

4:00 pm Malleable Shop Course

Presiding: Eric Welander, John Deere Malleable Works, East Moline, Ill.

Subject: **Pearlitic Malleable**—Discussion of various methods for producing pearlitic malleable iron: base iron, heat treatment, controls, finishing, and properties.

Panel: R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.; C. F. Joseph, Central Foundry Division, General Motors Corp., Saginaw, Mich.; Milton Tilley, National Malleable & Steel Castings Co., Cleveland; and P. F. Ulmer, Link-Belt Co., Indianapolis

4:00 pm Light Metals Session

Presiding: W. D. Stewart, Aluminum Co. of America, Pittsburgh, Pa.

Co-Chairman: A. Slachta, Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.

(Preprint 55-47)

Application of Insulated Risers to Production of Aluminum Alloy Sand Castings, W. A. Mader, Oberdorfer Foundries, Inc., Syracuse, N. Y.

Measurement of Gas in Molten Aluminum, H. Rosenthal and S. Lipson, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia

5:00 pm Registration and Publications Display Close

8:00 pm Gray Iron Shop Course

Presiding: K. H. Priestley, Vassar Electroloy Products, Inc., Vassar, Mich.

Co-Chairman: L. L. Clark, Armour Research Foundation, Chicago

Subject: **Practical Inoculation of Cupola Melted Irons**

Discussion Leader: Harold E. Barnum, Vanadium Corp. of America, Detroit

E. C. Troy

F. B. Rote

H. F. Bishop

D. T. Kindt

M. E. Annich

H. W. Antes

H. C. Barnes

C. E. Bieniosek

E. J. Wellauer

T. C. Bunch

8:00 pm Sand Shop Course

Presiding: R. H. Olmsted, Whitehead Bros. Co., Conneaut, Ohio

Co-Chairman: F. E. Kurtz, Electric Steel Castings Co., Indianapolis

Subject: **Fitting Sand Control to your Foundry**

Moderator: F. S. Brewster, Southgate Aluminum & Magnesium Co., Southgate, Calif.

Panel: T. C. Alford, Wheland Co., Chattanooga, Tenn.; F. W. Jacobs, Texas Foundries, Inc., Lufkin, Texas; and Harry Wilson, III, Foundry Div., Electron Corp., Littleton, Colo.

TUESDAY, MAY 24

8:00 am Authors and Officers Breakfasts: Sand Division; Education Division; Industrial Engineering Committee; Safety, Hygiene & Air Pollution Control Committee

8:30 am Registration and Publications Display Open

9:30 am Education Session

Subject: **Workshop for Local Chapter Education Committee Chairmen**

Presiding: R. Verne Righter, Central Foundry Division, General Motors Corp., Danville, Ill.

Co-Chairman: James R. Hewitt, Texas Foundries, Inc., Lufkin, Texas

Secretary: James L. Leach, University of Illinois, Urbana

Panel: A. C. Hensel, Albion Malleable Iron Co., Albion, Mich.; Frank C. Cech, Cleveland Trade School, Cleveland; Ormond Requadt, Foundry Div., Dow Chemical Co., Bay City, Mich.; and R. A. Oster, Beloit Vocational & Adult School, Beloit, Wis.

9:30 am Sand Session

Presiding: A. B. Keckley, Texas Electric Steel Castings Co., Houston

Co-Chairman and Secretary: H. E. Henderson, H. C. Macaulay Foundry Co., Berkeley, Calif.

Steel Foundry Sands at Elevated Temperatures, Progress Report, Committee 8-L, H. W. Meyer, General Steel Castings Co., Granite City, Ill.

The Scabbing Defect, Progress Report, Committee 8-J, R. L. Doelman, Miller & Co., Chicago

A New Foundry Sand Core Binder, Charles J. Gogek, George M. Moffett Research Laboratories, Corn Products Refining Co., Argo, Ill.

9:30 am Light Metals Session

Presiding: D. L. LaVelle, American Smelting & Refining Co., Barber, N. J.

Co-Chairman: J. W. Meier, Dept. of Mines & Technical Surveys, Ottawa, Ont.

The Meaning of the Cast Test Bar in the Evaluation of Aluminum and Magnesium Alloy Castings, A. G. Slachta and H. Mansfield, Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.

Mechanical Properties of Aluminum Alloy Castings, Roy E. Paine, Aluminum Co. of America, Vernon, Cal. and W. D. Stewart, Aluminum Co. of America, Pittsburgh, Pa.

9:30 am Malleable Session

Presiding: C. F. Joseph, Central Foundry Div., General Motors Corp., Saginaw, Mich.

Co-Chairman and Secretary: Milton Tilley, National Malleable & Steel Castings Co., Cleveland

R. C. Shnay

C. A. Sanders

R. Schneidewind

(Preprint 55-64)

Effects of Some Melting Variables on the Properties of Malleable Iron, AFS Sponsored Research Project, G. E. Kempka and R. W. Heine, University of Wisconsin, Madison

(June issue)

Metallurgical Controls for Duplexed Malleable, L. E. Emery, Marion Malleable Iron Works Div., Chicago Railway Equipment Co., Marion, Ind.

9:30 Brass and Bronze Session

Presiding: R. A. Colton, Federated Metals Div., American Smelting & Refining Co., Barber, N. J.

Co-Chairman: R. B. Fischer, Ingersoll Rand Co., Phillipsburg, N. J.

(Preprint 55-4)

Improvement of Pressure Tightness and Tensile Properties of Gun Metal Bronze by Vacuum Degassing, W. H. Johnson, H. F. Bishop, and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

Microporosity in Gunmetal Pressure Castings, Alfred Hesse, Stemac, Inc., Chicago; Marvin Glassenberg, Armour Research Foundation, Chicago; and W. H. Baer, Bureau of Ships, Navy Dept., Washington, D. C.

12:00 noon Education Round Table Luncheon

Presiding: W. J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind.

Co-Chairman: W. H. Ruten, Polytechnic Institute of Brooklyn (N. Y.)

Secretary: A. B. Sinnett, AFS Education Director

Subject: **In-Plant Training**

Speaker: Donald F. Lane, National Foreman's Institute, New York

12:00 noon Light Metals Round Table Luncheon

Presiding: M. E. Brooks, Dow Chemical Co., Bay City, Mich.

Co-Chairman: E. V. Blackmun, Aluminum Co. of America, Pittsburgh, Pa.

(Preprint 55-41)

Subject: **Castings in Airframe Design**

Speaker: George W. Papen, Lockheed Aircraft Corp., Burbank, Calif.

2:00 pm Industrial Engineering Session

Presiding: J. A. Westover, Westover Engineers, Milwaukee

Co-Chairman: L. W. Lehmann, John Deere Van Brunt Co., Horicon, Wis.

R. C. Williams

W. D. Stewart

P. F. Youngdahl

Production Standards and Their Place in the Foundry Industry, Stuart D. Martin, Central Foundry Div., General Motors Corp., Saginaw, Mich.

(Preprint 55-142)

Improving Foundry Paperwork, M. E. Mundel, Marquette University, Milwaukee

2:00 pm Brass and Bronze Session

Presiding: T. E. Gregory, Michigan Smelting & Refining Div., Bohn Aluminum & Brass Corp., Detroit

Co-Chairman: George H. Bradshaw, Naval Shipyard, Philadelphia

(Preprint 55-3)

Short-Time Elevated Temperature Properties of Three Copper-Base Casting Alloys, J. O. Edwards, Dept. of Mines and Technical Surveys, Ottawa, Ont.

Investigation of Precision Casting of Experimental Propellers, A. R. Willner, Seymour Goodman, and Charles L. Tippett, David Taylor Model Basin, Washington, D. C.

2:00-5:00 pm Air Pollution Control Session

Presiding: F. A. Patty, General Motors Corp., Detroit

Co-Chairman: J. C. Radcliffe, Ford Motor Co., Dearborn, Mich.

Secretary: W. N. Davis, AFS Safety, Hygiene & Air Pollution Control Program Director

Report on Program Activities and Introduction of Working Committee Chairmen, J. R. Allan, Allan Industries, Inc., Melbourne, Fla.

Report on Air Pollution Control Manual, F. A. Patty

Comparing Change in Emission Rate with Change in Metal Melting Rate (Hot & Cold Blast Operation), R. C. Ortgies, American Air Filter Co., Inc., Louisville, Ky.

Developments in Air Pollution Problems and their Effects on the Foundry Industry, George D. Clayton, George D. Clayton & Associates, Detroit

Round Table Discussion—Panel composed of members of Air Pollution Control Committee

2:00 pm Sand Session

Presiding: C. W. Williamson, Trinity Valley Iron & Steel Co., Fort Worth, Texas

Co-Chairman and Secretary: E. C. Zirzow, Werner G. Smith, Inc., Cleveland

(Preprint 55-101)

It Is Not All Sand! C. A. Sanders, American Colloid Co., Chicago and Nathan Levinsohn, Minneapolis-Moline Co., Minneapolis

Casting Finish—a Function of Sand Additives, Burdette Jones, John Deere Waterloo Tractor Works, Waterloo, Iowa

2:00 pm Malleable Session

Presiding: Fred Katzenski, International Harvester Co., Waukesha, Wis.

Co-Chairman and Secretary: W. D. McMillan, International Harvester Co., Chicago

Interrelation of Heat Treatment, Mechanical Prop-

J. F. Wallace

Sam F. Carter

R. Carlson

C. F. Christopher

W. E. Tracy

G. P. Dahm

R. K. Dailey

G. E. Dalbey

C. Locke

R. C. Ortgies

J. O. Edwards

R. E. Edelman

erties, and Machinability of Pearlitic Malleable Iron, J. E. Kruse, Albion Malleable Iron Co., Albion, Mich.

Effects of Molybdenum on Stability and High Temperature Properties of Pearlitic Malleable Iron, W. G. Scholz, D. V. Doane, Climax Molybdenum Co., Detroit

4:00 pm Brass and Bronze Shop Course

Presiding: F. L. Riddell, H. Kramer & Co., Chicago
Co-Chairman: Chester L. Mack, Chautauqua Hardware Co., Jamestown, N. Y.

Subject: **Shell Molding**

Dimensional Tolerances and Surface Structure in Various Shell Cast Metals, Richard A. Flinn, Walter B. Pierce, and Floyd R. Smith, University of Michigan, Ann Arbor, and Paul F. Youngdahl, Mechanical Handling Systems, Inc., Detroit

4:00 pm Malleable Shop Course

Presiding: R. W. Heine, University of Wisconsin, Madison

Subject: **Hot Tearing**

Has Research on Hot Tears Prevented Their Occurrence? B. C. Yearley, National Malleable & Steel Castings Co., Cleveland

Effects of the Melting Process on the Cracking Tendencies of Malleable Iron, F. W. Jacobs, Texas Foundries, Lufkin, Texas.

4:00 pm Light Metals Session

Presiding: F. E. Dye, Burndy Engineering Co., Inc., Lynwood, Calif.
Co-Chairman: C. R. Gregg, Gregg Iron Foundry, El Monte, Calif.

Production of Aluminum Alloy Specification Castings, R. E. Paine and P. V. Faragher, Aluminum Co. of America, Pittsburgh, Pa.

A Case Study of a Premium Strength Casting, A. J. Carah, Douglas Aircraft Co., Inc., Santa Monica, Calif.

5:00 pm Registration and Publications Display Close

6:00 pm Sand Division Dinner

Presiding: E. C. Zirzow, Werner G. Smith Co., Cleveland
Co-Chairman: Roy Carver, Carver Pump Co., Muscatine, Iowa

Subject: **The Carbon Dioxide Process for Hardening Cores and Molds** (oral and movie presentation)
Speaker: Dr. Waldemar Schumacher, Concordiahutte, A. G., Berndorf am Rhein, Germany

6:30 pm AFS Alumni Dinner (invitational)

Subject: **Human Relations in the Foundry Industry**
Speaker: C. C. Chambers, Texas Foundries, Inc., Lufkin, Texas

8:00 pm Gray Iron Shop Course

Presiding: K. H. Priestley, Vassar Electroloy Products, Inc., Vassar, Mich.
Co-Chairman: E. J. Burke, Hanna Furnace Corp., Buffalo, N. Y.

Subject: **Efficient Cupola Operation**
Discussion Leader: M. J. Henley, Tyler Pipe & Foundry Co., Tyler, Texas

H. F. Tayler

S. L. Gertsman

D. R. Walker

8:30 pm Sand Shop Course

Presiding: R. H. Jacoby, Key Co., East St. Louis, Ill.
Co-Chairman: K. L. Landgrebe, Foundry Div., Wheland Co., Chattanooga, Tenn.

Subject: **Sand Preparation Without Guesswork**
Moderator: F. S. Brewster, Southgate Aluminum & Magnesium Co., Southgate, Calif.
Panel: William E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind.; and Jean Danenfelser, International Harvester Co., Indianapolis

WEDNESDAY, MAY 25

8:00 am Authors and Officers Breakfasts: Gray Iron Division; Steel Division; Pattern Division; Plant and Plant Equipment Committee; Heat Transfer Committee; Refractories Committee

8:00 am Past Presidents' Breakfast

8:30 am Registration and Publications Display Open

9:30 am AFS Annual Business Meeting

Presiding: AFS National President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio

President's Annual Address

Apprentice Contest Awards

Election of Officers and Directors

10:30 am Charles Edgar Hoyt Memorial Lecture

Subject: **Education and the Future Foundryman**
Speaker: Fred J. Walls, International Nickel Co., Inc., Detroit

12:00 noon Industrial Engineering Round Table Luncheon

Presiding: Milton T. Sell, Sterling Foundry Co., Wellington, Ohio
Co-Chairman: Wallace E. Boswell, Glamorgan Pipe & Foundry Co., Lynchburg, Va.

(Preprint 55-141)

Your Hidden Fixed Costs and Their Effect on Profit and Loss, M. E. Annich, American Brake Shoe Co., Mahwah, N. J.

12:00 noon Gray Iron Round Table Luncheon

Presiding: James S. Vanick, International Nickel Co., Inc., New York
Co-Chairman: C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala.

J. E. Wilson

D. C. Williams

W. B. Pierce

Success for Castings = Design + Quality, William G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.

12:00 noon Pattern Round Table Luncheon

Presiding: J. W. Costello, American Hoist & Derrick Co., St. Paul, Minn.
Co-Chairman: A. F. Pfeiffer, Allis-Chalmers Mfg. Co., West Allis, Wis.

(This issue)

Sealing Metal Core Boxes Against Blow-By, Richard L. Olson, Dike-O-Seal Inc., Chicago

Wood Pattern Construction Standards and Specifications, John F. Roth, Cleveland Standard Pattern Works, Inc., Cleveland

2:00 pm Sand Session

Presiding: M. W. Williams, Houston Foundry & Machine Co., Houston
Co-Chairman and Secretary: J. B. Caine, Wyoming, Ohio

Current Status of Test Patterns for the Evaluation of Sand Mixtures, Charles Locke, West Michigan Steel Foundry Co., Muskegon, Mich.

2:00 pm Light Metals Session

Presiding: C. E. Nelson, Dow Chemical Co., Magnesium Div., Midland, Mich.
Co-Chairman: R. F. Thomson, Research Laboratories Div., General Motors Corp., Detroit

Report of Light Metals Division Research Committee on AFS-Sponsored Vertical Gating Project:

A Study of Fluid Flow of Light Alloys Through Vertical Gating Systems, Research Project Co-Sponsored by Frankford Arsenal and AFS (new, color, sound motion picture), J. G. Kura, Battelle Memorial Institute, Columbus, Ohio

2:00-5:00 pm Industrial Hygiene and Safety Session

Presiding: H. T. Walworth, Lumbermen's Mutual Casualty Co., Chicago
Co-Chairman: F. A. Patty, General Motors Corporation, Detroit
Secretary: W. N. Davis, AFS Safety, Hygiene & Air Pollution Control Program Director

Noise and Its Control in the Foundry, H. T. Walworth

Noise and Its Control (demonstration), F. A. Patty

Radiant Heat and Its Control (demonstration), W. G. Hazard, Owens-Illinois Glass Co., Toledo, Ohio

A New Theory for Grinding Wheel Failures, W. H. Cox and D. C. Williams, Ohio State University, Columbus

2:00 pm Heat Transfer Session. Dr. Harry A. Schwartz Memorial Forum on the Application of Heat Transfer Principles to Foundry Practice (Part I)

Presiding: Clarence E. Sims, Battelle Memorial Institute, Columbus, Ohio
Co-Chairman: Arthur P. Guidi, Texas Electric Steel Casting Co., Houston

Statement of Dedication, W. K. Bock, National Malleable & Steel Castings Co., Cleveland

Solidification of Finite Cylinders, Victor Paschkis, Columbia University Heat and Mass Flow Analyzer Laboratory, New York

L. L. Ellis

C. O. Schopp

P. H. Anderson

R. A. Flinn, Jr.

R. H. Greenlee

V. E. Zang

A. P. Guidi

G. J. Grott

R. W. Heine

G. E. Kempka

H. H. Hursen

H. E. Henderson

(Preprint 55-136)

Feeding Range in Shell Molds, R. E. Morey, H. F. Bishop, and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

The Risering Requirements of Nodular Iron, R. C. Shnay, Dept. of Mines and Technical Surveys, Ottawa, Ont.

Heat Transfer Problems in Permanent Molds for Aluminum Castings, W. A. Mader, Oberdorfer Foundries, Inc., Syracuse, N. Y.

2:00 pm Refractories Session

Presiding: Richard H. Stone, Vesuvius Crucible Co., Pittsburgh, Pa.

Co-Chairman and Secretary: Sam F. Carter, Jr., American Cast Iron Pipe Co., Birmingham, Ala.

Improving Refractory Cost in Malleable Melting, L. E. Emery, Marion Malleable Iron Works Div., Chicago Railway Equipment Co., Marion, Ind.

A Malleable Furnace Refractory Cost Reduction Program, Fred J. Pfarr and Albert S. Johnson, Lake City Malleable Co., Cleveland

4:00 pm Plant and Plant Equipment Session

Presiding: James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.

Co-Chairman: H. W. Johnson, Wells Mfg. Co., Skokie, Ill.

Shell Molding Process and Equipment, Carl O. Schopp, Link-Belt Co., Indianapolis, and James Sutherland, Link-Belt Co., Chicago

Mechanization for Small Foundries (motion picture), H. C. Weimer, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago

4:00 pm Gray Iron Session

Presiding: C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala.

Co-Chairman and Secretary: R. A. Clark, Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp., Detroit

Subject: **Gases in Cast Iron**

(Preprint 55-22)

Oxygen Content of Gray Cast Iron Increases with Time, R. C. Williams and Harold W. Lownie, Jr., Battelle Memorial Institute, Columbus, Ohio

(Preprint 55-25)

Dissolved Gases in Liquid Cast Iron, William Y. Buchanan, John Lang & Sons, Ltd., Johnstone, Renfrewshire, Scotland

4:00 pm Steel Session

Presiding: S. L. Gertsman, Dept. of Mines and Technical Surveys, Ottawa, Ont.

Co-Chairman: John R. Patton, General Steel Casting Corp., Granite City, Ill.

(Preprint 55-123)

High Temperature Impact Properties of Cast Steel, Charles F. Christopher, Continental Foundry & Machine Co., East Chicago, Ind.

The Influence of Molding Materials on the Incidence of Hot Tearing, J. M. Middleton, British Steel Castings Research Assn., Sheffield, England

(Preprint 55-122)

A Metallographic Study of Ruptures in Steel Castings, J. B. Caine, Wyoming, Ohio

5:00 pm Registration and Publications Display Close

7:00 pm Annual Banquet

Presiding: Frank J. Dost, AFS National President, Sterling Foundry Co., Wellington, Ohio

Presentation of AFS Gold Medal Awards and Honorary Life Memberships

Address by Hugh M. Comer, Avondale Mills, Sylacauga, Ala.

THURSDAY, MAY 26

8:30 am Registration and Publications Display Open

9:30 am Sand Session

Presiding: Jake Dee, Dee Brass Foundry, Houston

Co-Chairman: F. P. Goettman, Standard Sand Co., Grand Haven, Mich.

(Preprint 55-105)

Fundamental Principles of Agglomerating Process, Carl Ludwig, Bonnot Co., Canton, Ohio

Microscopy and Molding Sands, V. D. Frechette, New York State College of Ceramics, Alfred

9:30 am Gray Iron Session

Presiding: J. S. Vanick, International Nickel Co., Inc., New York

Co-Chairman: F. T. McGuire, Deere & Co., Moline, Ill.

Subject: **Injection Methods for Gray Iron**

(Preprint 55-26)

Calcium Carbide Desulphurization by the Injection Process, John A. DeHuff, Air Reduction Research

Laboratory, Murray Hill, N. J. and R. Schneidewind, University of Michigan, Ann Arbor

(Preprint 55-27)

Increasing the Carbon Content of Cast Irons by Ladle Injection, G. E. Spangler, Air Reduction Research Laboratory, Murray Hill, N. J. and R. Schneidewind, University of Michigan, Ann Arbor

(Preprint 55-28)

New High Strength Cast Irons Produced by Injection Methods, James W. Estes, Air Reduction Research Laboratory, Murray Hill, N. J. and R. Schneidewind, University of Michigan, Ann Arbor

9:30 am Pattern Session

Presiding: Harry Arneson, Spring City Pattern Works, Waukesha, Wis.

Co-Chairman: G. E. Garvey, City Pattern & Foundry Co., Inc., South Bend, Ind.

Gypsum Cement Molds for Plastic Patterns, M. K. Young, United States Gypsum Co., Chicago

Research in the Patternmaking Industry, David T. Kindt, Kindt-Collins Co., Cleveland

9:30 am Steel Session

Presiding: Dale Hall, Oklahoma Steel Casting Co., Tulsa, Okla.

Co-Chairman: James H. Lowe, Mid-Continent Steel Casting Corp., Shreveport, La.

(This issue)

What Design Engineers Look for in Castings, Trevor Davidson, Bucyrus-Erie Co., South Milwaukee, Wis.

Steel Castings—Their Engineering Advantages in Weldments, E. J. Wellauer, Falk Corp., Milwaukee

Hot Tears, Lyle L. Clark, Armour Research Foundation, Chicago

The Use of Steel Castings by the Southern Pacific Company, B. F. Kline, Southern Pacific Co., Sacramento, Calif.

12:00 noon AFS Board of Directors Luncheon

Presiding: Frank J. Dost, AFS National President, Sterling Foundry Co., Wellington, Ohio

12:00 noon Steel Round Table Luncheon

Presiding: V. E. Zang, Unitcast Corp., Toledo, Ohio

Subject: **New There's a Good Question—Have You An Answer?**

2:00 pm Heat Transfer Session. Dr. Harry A. Schwartz Memorial Forum on the Application of Heat Transfer Principles to Foundry Practice (Part II)

Presiding: B. C. Yearley, National Malleable & Steel Castings Co., Cleveland

Co-Chairman: James H. Lowe, Mid-Continent Steel Casting Corp., Shreveport, La.

Application of Heat Transfer to Hot Tearing, J. B. Caine, Wyoming, Ohio

Application of Indirect Chills, Charles Locke, West Michigan Steel Foundry Co., Muskegon, Mich.

Application of Insufficient Chills, E. C. Troy, Riverton, N. J.

Risering of Commercial Steel Castings, Charles W. Briggs, Steel Founders' Society of America, Cleveland

2:00-5:00 pm Dust Control and Ventilation Session

Presiding: John G. Liskow, American Air Filter Co., Inc., Louisville, Ky.

Co-Chairman: A. G. Granath, National Engineering Co., Chicago

Secretary: W. N. Davis, AFS Safety, Hygiene & Air Pollution Control Program Director

Engineering Manual for Control of In-Plant Environment in Foundries, John G. Liskow

Effects of Inlet and Outlet Connections Upon Fan Performance (demonstration), W. E. Tracy, Sturtevant Div., Westinghouse Electric Corp., Chicago

Duct Work Efficiencies (demonstration), Kenneth Robinson, General Motors Corp., Detroit

2:00 pm Refractories Session

Presiding: W. R. Jaeschke, Whiting Corp., Harvey, Ill.

Co-Chairman: F. W. Jacobs, Texas Foundries, Inc., Lufkin, Texas

Secretary: H. E. Henderson, Lynchburg Foundry Co., Lynchburg, Va.

Forehearth Refractories for Soda Ash Desulphurizing, Sam F. Carter and Ralph Carlson, American Cast Iron Pipe Co., Birmingham, Ala.

High-Duty, Super-Duty, and High-Alumina Refractories in the Foundry, L. L. Gill, Harbison-Walker Refractories Co., Pittsburgh, Pa.

Monolithic Converter Linings, Official Exchange Paper from the Institute of British Foundrymen, Australian Branch (Victoria), J. Davies, Messrs. Davies & Baird Pty., Ltd., Melbourne, Australia

2:00 pm Gray Iron Session

Presiding: James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

W. R. Jennings

W. H. Johnson

A. S. Johnson

W. Rostoker

D. W. Levinson

S. Lipson

H. W. Lownie, Jr.

C. Ludwig

W. A. Mader

F. J. Pfarr

S. D. Martin

D. J. Reese

Co-Chairman: J. H. Kimes, Jr., Lufkin Foundry & Machine Co., Lufkin, Texas
Secretary: Ralph Laforet, Lakey Foundry Corp., Muskegon, Mich.

Subject: **Upgrading and Machinability**

(Preprint 55-23)

Fluidization-Injection Process for Desulphurizing and Upgrading Cast Iron: A Progress Report, G. P. Dahm, H. C. Barnes, and C. E. Bieniosek, Linde Air Products Co. Div., Union Carbide & Carbon Corp., Newark, N. J.

(Preprint 55-30)

Machinability Testing—Relation Between Cutting Temperature and Tool Life for Gray Cast Irons, E. A. Loria, Crucible Steel Co. of America, Pittsburgh, Pa. and D. R. Walker, Massachusetts Institute of Technology, Cambridge

(April issue)

Developments in the Light Castings Industry Including the New Die Pressing Process, Official Exchange Paper from the Institute of British Foundrymen, R. S. M. Jeffery, Federated Foundries, Ltd., Manchester, England

2:00 pm Sand Session

Presiding: C. R. McGrail, Alamo Iron Works, San Antonio, Texas
Co-Chairman and Secretary: W. R. Moggridge, Ford Motor Co. of Canada, Ltd., Windsor, Ont.

(Preprint 55-102)

Use of Engineering Methods in Practical Sand Problems: Strength — Density Relationships, V. E. Zang and G. J. Grott, Unitcast Corp., Toledo, Ohio

3:00 pm Steel Session

Presiding: Roy C. Hobson, National Malleable & Steel Casting Co., Cicero, Ill.
Co-Chairman: Hubert Chappie, National Supply Co., Torrance, Calif.

Manufacture of High-Quality Pressure Tight Steel Castings, J. F. Wallace, Case Institute of Technology, Cleveland

Factors that Contribute to the Production of Clean Castings, C. B. Williams, Massillon Steel Casting Co., Massillon, Ohio

(April issue)

Development of a Bottom Pour Ladle Practice for Quality Steel Castings, A. W. Fastabend, American Steel Foundries, East Chicago, Ind.

(Preprint 55-125)

Ladle Practice, Arthur P. Guidi, Texas Electric Steel Casting Co., Houston

4:00 pm Pattern Session

Presiding: A. F. Pfeiffer, Allis-Chalmers Mfg. Co., West Allis, Wis.
Co-Chairman: John F. Roth, Cleveland Standard Pattern Works Inc., Cleveland

High Pressure Molding, T. E. Barlow, Eastern Clay Products Dept. of International Minerals & Chemical Corp., Chicago

(April issue)

Precision Patterns from Zircon Molds, J. E. Stock and A. V. Schoville, John Deere Waterloo Tractor Works, Waterloo, Iowa

4:00 pm Gray Iron Session

Presiding: Alfred Boyles, U. S. Pipe & Foundry Co., Burlington, N. J.
Co-Chairman: C. R. McGrail, Alamo Iron Works, San Antonio, Texas
Secretary: H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, Ohio

Subject: **Nodular Iron**

(Preprint 55-32)

Nickel Austenitic Ductile Irons, F. G. Sefing, International Nickel Co., Inc., New York

(Preprint 55-21)

Theory of Nodular Graphite Formation in Ductile Cast Iron, Paul H. Anderson, South Dakota School of Mines and Technology, Rapid City

Hardenability of Ductile Cast Iron, C. C. Reynolds, W. T. Whittington, and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

4:00 pm Sand Session

Presiding: DeWitt McKinley, McKinley Iron Works, Fort Worth, Texas
Co-Chairman: W. E. Kinread, Whiting Corp., Ltd., Toronto, Ont.

Load-Carrying Power of Molding Sands, Harry W. Dietert, F. S. Brewster, and Alexander Graham, Harry W. Dietert Co., Detroit

5:00 pm Registration and Publications Display Close

7:00 pm Texas Chapter Night (entertainment program)

FRIDAY, MAY 27

8:30 am **Registration and Publications Display Open**

9:30 am **Gray Iron Session**

Presiding: W. C. Jeffery, University of Alabama, Tuscaloosa, Ala.

Co-Chairman: E. E. Pollard, Tyler Pipe & Foundry Co., Tyler, Texas

Secretary: H. J. Pfeiffer, Jr., Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp., Houston

Subject: **Gating and Risering**

The Risering of Nodular Iron—Part II—The Effect of Silicon Content on Feeding Distance, R. C. Shnay and S. L. Gertsman, Dept. of Mines and Technical Surveys, Ottawa, Ont.

(April issue)

Risering of Ductile Cast Iron—Riser Dimensions, Feeding Distance, and Other Data, R. A. Flinn and W. A. Spindler, University of Michigan, Ann Arbor and D. J. Reese, International Nickel Co., Inc., Bayonne, N. J.

Risering of Gray Iron Castings—Report No. 6, AFS Sponsored Research Project, E. F. Sullivan, Jr., C. M. Adams, Jr., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

9:30 am **Sand Session**

Presiding: Robert R. Cline, Nibco of Texas, Inc., Div. of Northern Indiana Brass Co., Nacogdoches, Texas

Co-Chairman and Secretary: B. H. Booth, Carpenter Bros., Inc., Milwaukee

Core Room Practice Pitfalls, R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.

(Preprint 55-107)

A Critical Analysis of the Cylindrical Standard Test Specimen for Foundry Sands, Walter Goetz, George Fischer, Ltd., Schaffhausen, Switzerland

Reactions During Core Baking, G. J. Grott, Unitcast Corp., Toledo, Ohio and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

Clay, Fines, and Water Relationships for Green Strength in Molding Sands, A. H. Zrimsek and R. W. Heine, University of Wisconsin, Madison

9:30 am **Steel Session**

Presiding: Thomas H. Shartle, Texas Electric Steel Casting Co., Inc., Houston

Co-Chairman: Allan Bixby, National Malleable & Steel Castings Co., Melrose Park, Ill.

A Simplified Method for Determining Riser Dimensions, H. F. Bishop, E. T. Myskowski, and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

Application of Chills for the Solidification of Rib and Boss Hot Spots on Plates, H. F. Bishop and E. T. Myskowski, Naval Research Laboratory, Washington, D. C.

(Preprint 55-130)

Pressure Pouring and Graphite Permanent Molds used in the Production of Steel Car Wheels, Hale H. Hursen, Griffin Wheel Co., Chicago

12:00 noon **Joint Luncheon—Society for Nondestructive Testing and American Foundrymen's Society**

Presiding: A. W. Gilbert (Carbide & Carbon Chemical Co., Texas City, Texas), chairman Houston Section, Society for Nondestructive Testing

Subject: **Nondestructive Testing—a Valuable Tool for the Foundryman**

Speaker: Hans J. Heine, AFS Technical Director

2:00 pm **Symposium on Nondestructive Testing**

Presiding: A. W. Gilbert

Co-Chairman: Hans J. Heine

(This issue)

Improved Casting Quality Through Nondestructive Testing, Francis H. Hohn, Scullin Steel Co., St. Louis

Use of Cobalt 60 for Castings, Jewelle N. Ketchbaw, Industrial Welding & Testing Laboratory, Houston

Magnetic Particle Inspection, Kermit Skeie, Magnaflux Corp., Chicago

X-Ray and Gamma Radiography, J. K. Bell, Sam Tour & Co., Inc., New York

Experimental Stress Analysis, Joe W. Beckham, Texas Foundries, Inc., Lufkin, Texas

Industrial Radiography, T. Howard Rogers, Naval Research Establishment of Canada, Halifax, Nova Scotia

The Use of Radiography in the Nondestructive Testing of Castings, W. D. Kiehle, Eastman Kodak Co., Rochester, N. Y.

2:00 pm **Registration Closes**

4:00 pm **Publications Display Closes**

4:00 pm **59th Annual AFS Convention Officially Closes**

A. H. Murphy

M. E. Mundel

W. S. Pellini

E. T. Myskowski

R. E. Paine

K. E. Nelson

NATIONAL OFFICERS and DIRECTORS

of the

AMERICAN FOUNDRYMEN'S SOCIETY

F. J. Dost, Pres.
Sterling Foundry Co.

B. L. Simpson, Vice-Pres.
National Engineering Co.

C. L. Carter,
Immediate Past Pres.
Albion Malleable Iron Co.

Terms expire 1955

M. A. Fladoes, Sivyer Steel Casting Co., Milwaukee

W. J. Klayer, Aluminum Industries, Inc., Cincinnati

J. O. Klein, Texas Foundries, Inc., Lufkin, Texas

A. D. Matheson, French & Hecht Div., Kelsey-Hayes Wheel Co., Davenport, Iowa

H. G. Robertson, American Steel Foundries, Alliance, Ohio

C. B. Schneible, Claude B. Schneible Co., Detroit (Died April 15, 1955)

J. T. Westwood, Jr., Blue Valley Foundry Co., Kansas City, Mo.

Terms expire 1956

C. E. Brust, Eastern Malleable Iron Co., Naugatuck, Conn.

E. C. Hoenicke, Eaton Manufacturing Co., Detroit

Thomas Kavony, Jr., Herman Pneumatic Machine Co., Pittsburgh, Pa.

M. J. Lefler, Oliver Corp., South Bend, Ind.

C. V. Ness, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago

W. R. Pindell, Northwest Foundry & Furnace Works, Portland, Ore.

G. Ewing Tait, Dominion Engineering Works, Ltd., Montreal, Quebec

Terms expire 1957

Frank C. Coch, Cleveland Trade School, Cleveland

L. H. Durdin, Dixie Bronze Co., Birmingham, Ala.

B. G. Emmett, Los Angeles Steel Casting Co., Los Angeles

W. M. Hamilton, Crane Co., Chattanooga, Tenn.

W. A. Morley, Link-Belt Co., Olney Foundry, Philadelphia

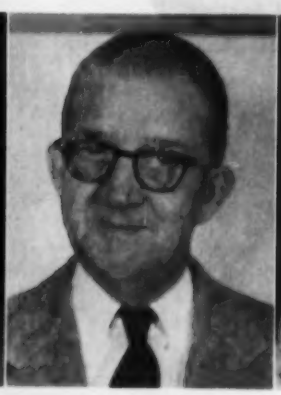
E. R. Oeschger, General Electric Co., Schenectady, N. Y.

Harold L. Ullrich, Foundry Engineer, Livingston, N. J.

H. G. Robertson
Vice-President, Region 1

E. C. Hoenicke
Vice-President, Region 2

M. A. Fladoes
Vice-President, Region 3



J. O. Klein
Vice-President, Region 4

B. G. Emmett
Vice-President, Region 5

W. J. Klayer

A. D. Matheson

C. B. Schneible
died April 15, 1955

J. T. Westwood, Jr.

C. E. Brust

Thomas Kaveny, Jr.

M. J. Lefler

C. V. Nass

W. R. Pindell

G. E. Tait

F. C. Cech

L. H. Durdin

W. M. Hamilton

W. A. Morley

E. R. Oeschger

H. L. Ullrich

Mrs. Jake Dee
Chairman

FOR THE *Ladies*

Mrs. James R. Hewitt
Co-Chairman

SIGHTSEEING, fashion show, and channel cruise are among special events for ladies attending the 59th Annual AFS Convention. In addition they will want to attend the Annual Banquet and the very extra special Texas Chapter Night festivities with their men.

Ladies are requested to register and secure tickets for events they desire to attend. Registration opens Monday, May 23, at 9:30 am and continues through Thursday noon, May 26; hours are from 9:30 am to 4 pm except Thursday when registration closes at noon. Members of the registration committee will be in attendance at all times. The following events have been arranged for the ladies:

Monday, May 23, 3–5 pm: Official AFS Reception and Tea, Grecian Room, Shamrock Hotel, National President Frank J. Dost will welcome guests on behalf of the Society.

Tuesday, May 24, 9:45 am: Tour of the City. Chartered motor coaches leaving the Shamrock and Rice Hotels will take the ladies to points of interest in Houston including the Texas Medical Center, Rice Institute, the Museum of Fine Arts, and the Contemporary Art Museum. Lunch at the College Inn is included. The tour will then continue to the University of Houston and the San Jacinto Battleground; buses will then return to their respective hotels.

Wednesday, May 25, 10 am–3 pm: Bus Trip to Galveston. Chartered buses will leave the Shamrock Hotel at 10 am and the Rice Hotel at 10:30 am; luncheon is not included with arrangements.

An afternoon Channel Cruise (2–5 pm) will provide pleasant relaxation and sightseeing on the Houston Port Authority's cruiser *Sam Houston* down the Ship Channel to San Jacinto and back. Reservations are limited to fifty (50) ladies. Chartered buses will leave the Shamrock Hotel promptly at 1 pm and the Rice Hotel at 1:30 pm.

Annual AFS Banquet (7–9 pm), Shamrock Hotel. Tickets are available only at the AFS Registration Headquarters at the Rice Hotel.

Thursday, May 26, 12:15 – 2:30 pm: Luncheon and Fashion Show, Emerald Room, Hotel Shamrock; fashions courtesy of the Smart Shop.

Texas Chapter Night (6:30–10 pm). Preceding the Texas-style Bar-B-Q at the Pin Oaks Stables Horse Show Pavilon will be a mounted drill by the famous Harris County Sheriff's Posse. After dinner the sheriff will make some interesting "arrests." Additional ranch-style entertainment will complete the evening. Tickets are available at the Ladies' Registration Booth as well as at the AFS Registration Headquarters.

Ladies Entertainment Committee
General Committee

Mrs. Jake Dee, *Chairman*
Mrs. James R. Hewitt, *Co-Chairman*

Registration Committee

Mrs. P. B. Croom, *Chairman*
Mrs. Marvin W. Williams
Mrs. John M. Bird
Mrs. W. A. Bearden
Mrs. J. D. Magee
Mrs. C. W. Williamson

Hospitality Committee

Mrs. F. M. Wittlinger, *Chairman*
Mrs. J. O. Klein
Mrs. Harry W. Dietert
Mrs. E. W. Wey
Mrs. Ivan L. Greene
Mrs. Wilbur A. Bittel
Mrs. J. Robert McBride
Mrs. J. Lawrence Ennis
Mrs. Israel Smith
Mrs. E. F. Laminack
Mrs. Herbert Holmgreen, Sr.
Mrs. Robert E. Smith
Mrs. William H. Clarkson, III

Program Committee

Mrs. Henry W. Creeger, Jr., *Chairman*
Mrs. W. H. Lyne
Mrs. Elmore C. Brown

Member-At-Large

Mrs. J. O. Klein

Texas Chapter Liaison

Mr. James R. Hewitt, *Chairman*
Mr. Jake Dee, *Co-Chairman*

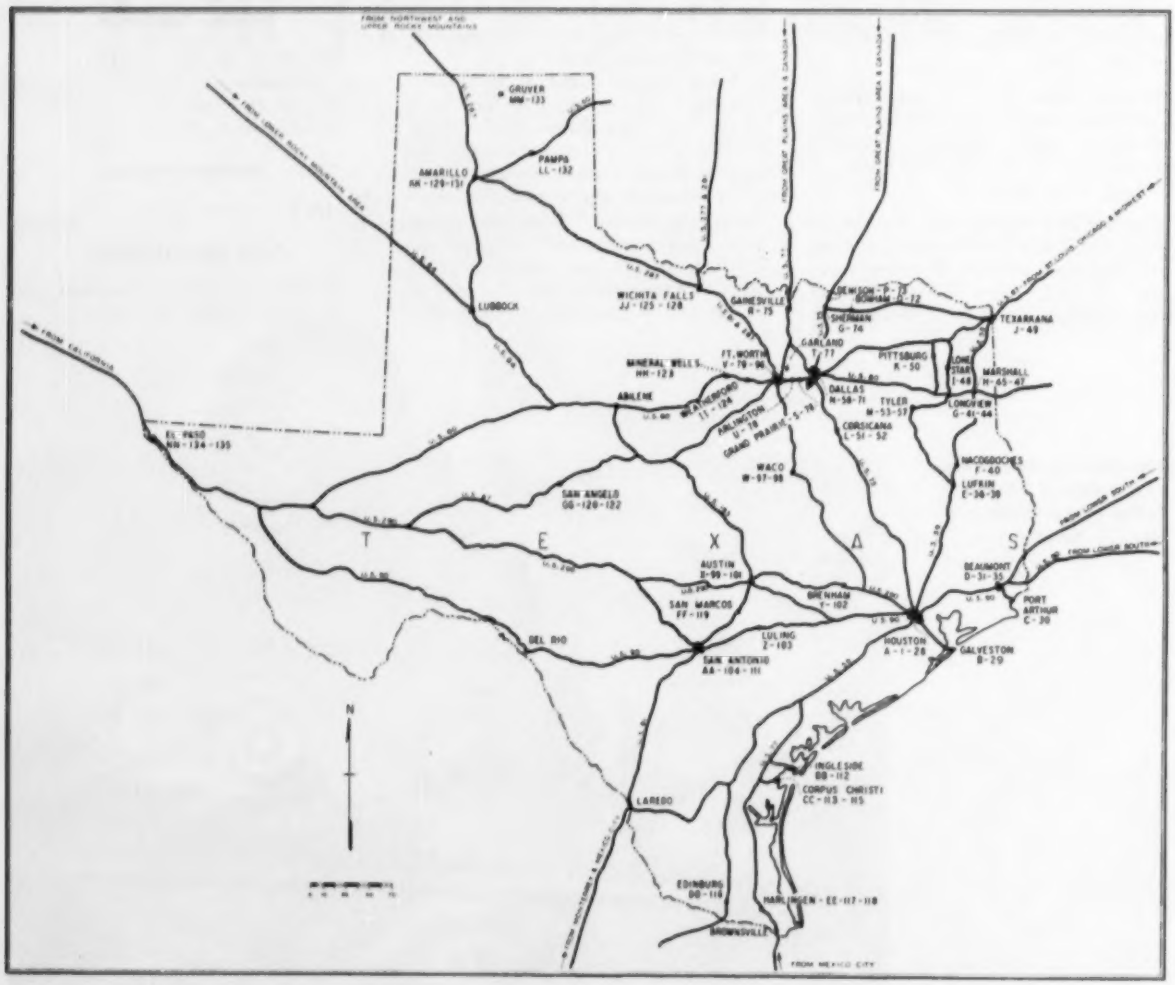
Houston ship channel trip is a feature of this year's ladies entertainment program in Houston.

Plant Visits

give broad industry view

Foundrymen attending the 1955 AFS Convention will have opportunities to view the breadth of industrialization of Texas as represented by industries in the Houston area. Registration at the Plant Visitation desk on the mezzanine of the Rice Hotel, at least one day before the visit, will insure that sufficient guide service will be provided. Houston plants on the visitation schedule are listed at the top of the following page.

Foundries and pattern shops elsewhere in the state invite convention-goers to stop on their way to and from Houston. Arrangements for these visits should be made directly with the foundries concerned. The accompanying map and key will help foundrymen plan.



Monday, May 23

Morning: no visits scheduled.

1:00-4:00 pm: **Quality Electric Steel Castings, Inc.,** 7704 Wallisville Rd. (Tel: OR-6625), contact in charge—T. B. DeYoung. Steel castings for oil field equipment. Arc furnace melting; heat treating, welding, and pattern shops.

1:00-4:00 pm: **Houston Pattern Works,** 5210 Canal St. (Tel: WA-5859), contact in charge—P. B. Croom. Wood and metal patterns.

Tuesday, May 24

9:00-noon: **Hughes Tool Co.,** 5425 Polk Ave. (Tel: WO-3101), contacts in charge—Jimmy Delmar and W. H. Lyne. Gray iron and steel castings for own oil well drilling equipment. Sand and permanent molds; 4 and 6-spindle centrifugal casting machines; electric furnace melting. Machine shops, laboratories, and pattern and welding shops.

2:00-4:30 pm: **Cleco Air Tool Div., Reed Roller Bit Co.,** 5125 Clinton Dr. (Tel: OR-1761), contact in charge—Ray V. Gillispie. Mechanized machining operations of only air tool manufacturer in the South.

2:00-4:30 pm: **Wolf Pattern Works,** 4820 Clinton Dr. (Tel: OS 3-4286), contact in charge—Joseph A. Wolf. Wood and Metal patterns.

Wednesday, May 25 . . . no visits

Thursday, May 26

9:30-11:30 am: **Oil Tool Div., Reed Roller Bit Co.,** 6501 Navigation Blvd. (Tel: WO-3121), contact in charge—Paul B. Cravey. Mechanized machining operations on oil well drilling equipment components.

9:30-11:30 am: **Federal Steel Products Corp.,** 415 N. St. Charles St. (Tel: CA-6315), contact in charge—A. B. Patison. Semi-mechanized; steel castings; arc furnaces and machine shop.

1:00-4:00 pm: **Dee Brass Foundry, Inc.,** 2408 Everett St. (Tel: CA-6271), contacts in charge—Nathan Guarino and Jake Maenza. Brass, bronze, and aluminum castings; mechanized shop; sand and permanent molds.

1:00-4:00 pm: **Texas Electric Steel Casting Co.,** Bringhurst & Gillespie Sts. (Tel: BL-6503), contact in charge—W. M. Ferguson. Highly mechanized jobbing shop; acid and basic electric steel castings for oil field pressure and non-pressure equipment, gears, steel mill, cement mill, and marine equipment.

Friday, May 27

9:00-noon: **Cameron Iron Works, Inc.,** Katy & Silber Rds. (Tel: VI-4411), contact in charge—A. D. Blackledge. High pressure valves and oil well control equipment by split-die process of press forging. Electric steel, ingot casting and blooming, and machine shops.

A. A. Brass & Aluminum Foundry	AA	104
A. B. C. Foundry Co.	V	79
Abco Aluminum & Brass Works	A	1
Ace Brass & Aluminum Casting Co.	N	58
Acme Brass Foundry Co. of San Antonio	AA	105
Advance Foundry	A	2
Alamo Boiler & Machine Works, Inc.	W	97
Alamo Iron Works	AA	106
Alloy Casting Co.	N	59
Amarillo Foundry Co.	KK	129
American Brake Shoe Co.	A	3
American Brass Foundry	V	80
American Mfg. Co. of Texas	V	81
Arlington Texas Industries Inc.	U	78
Arvel Industries	JJ	125
B. & W. Engineering & Mfg. Co.	GG	120
S. S. Bedinger & Co.	II	124
Bateman Foundry & Machine Co.	HH	123
Beaumier Iron Works	Y	102
Bell Aircraft Corp.	V	82
Bethlehem Supply Co.	L	51
Bonham Foundry Co.	O	72
Bronze-Art Casting & Plating Co.	A	4
Cedergren Metals Co.	N	60
Chance Vought Aircraft Div., United Aircraft Corp.	S	76
City Brass Foundry	AA	107
John Clark Industries, Inc.	FF	119
Coastal Foundry Co.	A	5
Crow Iron Works	DD	116
W. F. Curlee Mfg. Co.	A	6
D & H Foundry	X	99
Dallas Foundry Inc.	N	61
Darbyshire Steel Co., Inc.	NN	134
Dee Brass Foundry, Inc.	A	7
Douglas Marine Repair	BB	112
Edgin Brass Mfg. Co.	V	83
East Texas Foundry & Machine Co.	H	45
East Texas Steel Castings Co., Inc.	G	41
Farmer's Marine Copper Works, Inc.	B	29
Federal Steel Products Corp.	A	8
Fort Worth Steel Machinery	N	62
Fort Worth Steel & Machine Co.	V	84
Gainesville Iron Works	R	75
Garrett Brass & Machine Co., Inc.	A	9
Globe Foundry & Machine Co.	KK	130
Greens Bayou Foundry	A	10
Grubbs Foundry	NN	135
J. H. Gruver & Son	MM	133
Gulf Star Foundries	CC	113
Gustafson Foundry Inc.	CC	114
Hall Level Mfg. Works	X	100
Harrisburg Machine Co., Inc.	A	11
Higginbottom Brass Works	V	85
Houston Foundry & Machine Co.	A	12
Hughes Gun Co.	A	13
Hughes Tool Co.	A	14
Intercontinental Mfg. Co., Inc.	T	77
Iron Casting Inc.	D	31
Jordens Foundry	E	36
G. A. Kelly Plow Co.	G	42
Kincaid-Osburn Electric Steel Co.	AA	108
Lloyd Metal Foundry Co.	A	15
Lone Star Steel Co. (main office)	N	63
Lone Star Steel Co.	I	48
Longview Brass & Aluminum Co.	G	43
Longview Electric Motor Co.	G	44
Lufkin Foundry & Machine Co.	E	37
Luling Machine & Iron Works	Z	103
Mabry Foundry & Machine Co.	D	32
MacKay Foundry Co.	E	38
Magnus Metal Div., National Lead Co.	A	16
Magnus Metal Div., National Lead Co.	V	86
Marshall Car Wheel & Foundry Co.	H	46
McKinley Iron Works	V	87
McKinley Metal	V	88
Midland Mfg. Co.	V	89
Model Brass Co.	N	64
George M. Moore	A	17
Mosley Machinery	W	98
Murray Co. of Texas	N	65
Nibco of Texas, Inc.	F	40
Oil City Brass Works Inc.	D	33
Oil City Iron Works	L	52
Pampa Foundry Co.	LL	132
Pioneer Foundry	A	18
Pittsburgh Foundry & Machine Co.	K	50
N. L. Prater Mfg. Co.	A	19
Quality Electric Steel Castings Co.	A	20
Refinery Castings Co.	N	66
San Angelo Foundry & Machine Co.	GG	121
San Antonio Machine & Supply Co.	AA	109
San Jacinto Brass Works	D	34
Service Foundry Co.	D	35
Service Metal Co., Inc.	A	21
Shaw Foundry Co.	N	67
Sheffield Steel Co.	A	22
Sherman Foundry Co.	Q	74
Skyvara Foundry	A	23
Smith Brass Foundry	V	90
Francis Smith Co.	N	68
Smith Steel Casting Co.	H	47
Southern Aluminum Foundry Co.	M	57
Southern Wheel Div., American Brake Shoe Co.	A	24
Southwestern Brass Works, Inc.	V	91
Specialty Mfg. Co.	EE	117
Standard Brass & Mfg. Co.	C	30
Star Foundry Co.	A	25
Stern Precision Casting Corp.	A	26
Stevenson Foundry	N	69
Stocker Mfg. Co.	KK	131
Taylor Foundry Co.	JJ	126
Tekell Brass Foundry	JJ	127
Texaloy Foundry Co., Inc.	AA	110
Texas Aluminum Foundry	V	92
Texas Bronze Mfg. Co.	V	93
Texas Electric Steel Casting Co., Inc.	A	27
Texas Foundries, Inc.	E	39
Texas Steam Engine Works	J	49
Texas Steel Co.	V	94
Thompson Aluminum & Brass Foundry	M	53
Tips Engine Works	X	101
Trinity Brass & Copper Co.	N	70
Trinity Valley Iron & Steel Co.	V	95
Tri-Pak Machine Service, Inc.	EE	118
Trojan Foundries	N	71
Tyler Pipe & Foundry Co.	M	54
Tyler Specialty Co.	M	55
Wells Brass Foundry	CC	115
Western Foundry Co.	M	56
Western Iron Works	GG	122
Wichita Falls Foundry & Machine Co.	JJ	128
Wilson Foundry & Machine Co.	A	28
W. H. Winterborne & Sons	AA	111
Worth Mfg. Co., Inc.	V	96
Wrights Aluminum Works	P	73

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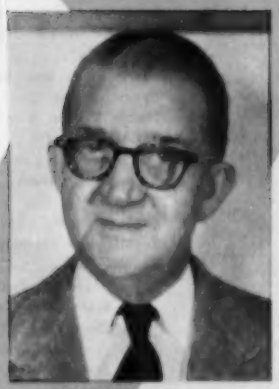
F. M. Wittlinger

Edward W. Wey



J. O. Klein

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E. B. Germany, Lone Star Steel Co.
John H. Royall, Royall Fire Brick & Supply Co.
Henry J. Leblanc, Standard Brass & Mfg. Co.
George E. Bryant, Jr., Oil City Brass Works, Inc.
George W. Armstrong, Jr., Texas Steel Co.
Harry E. Rogers, Hughes Tool Co.
C. V. Smith, Jr., Smith Steel Casting Co.
C. H. Elliott, Cleco Div., Reed Roller Bit Co.

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William Clarkson, III, Oil City Iron Works.
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R. H. Glenney

Wilbur A. Bittel

J. Robert McBride

Robert E. Smith

C. W. Williamson

J. L. Ennis

New Processes Described in Overseas Papers

Die Pressing process, CO_2 core hardening, critique of an AFS sand test, gas-in-metal, hot tearing, and long-lived furnace linings are covered by overseas authors at the 59th AFS Convention.

Official exchange paper from the Institute of British Foundrymen, *"Developments in the Light Castings Industry Including the New Die Pressing Process,"* will be presented to the Thursday, May 26, 2 pm Gray Iron Session by R. S. M. Jeffrey, Federated Foundries, Ltd., Manchester, England. Mr. Jeffrey recounts developments in enamelling, working conditions, technical investigations, and mechanization (see page 88).

Author of the official exchange paper from the Australian Branch (Victoria) of the Institute of British Foundrymen, *"Monolithic Converter Linings,"* is J. Davies, Messers. Davies & Baird Pty., Ltd., Melbourne. Mr. Davies will tell the Thursday, May 26, 2 pm Refractory Session how bentonite-bonded quartz, graded to maximum packing density, increased rammed converted lining life.

Dr. Waldemar Schumacher, Concordiahütte A. G., Berndorf am Rhein, Germany, will present, for the first time in the United States, *"The Carbon Dioxide Process for Hardening Cores and Molds"* at the Sand Division Dinner, 6 pm, Tuesday, May 24 (motion picture).

Walter Goetz, George Fischer, Ltd., Schaffhausen, Switzerland, presents *"A Critical Analysis of the Cylindrical Standard Test Specimen for Foundry Sands"* at the 9:30 am Sand Session on Friday, May 27. Mr. Goetz reviews foreign criticisms for and against the AFS specimen and presents his own sand test findings.

Wm. Y. Buchanan

J. M. Middleton

Dr. W. Schumacher

William Y. Buchanan, John Lang & Sons, Ltd., Johnstone, Renfrewshire, Scotland, will present *"Dissolved Gases in Liquid Cast Iron"* to the 4 pm Gray Iron Session, Wednesday, May 25. Mr. Buchanan will tell how these gases cause casting defects, how to collect gases for analysis, and how the problem may be minimized.

J. M. Middleton, British Steel Castings Research Association, Sheffield, England, is author of *"The Influence of Molding Materials on the Incidence of Hot Tearing."* Mr. Middleton will tell the 4 pm Steel Session, Wednesday, May 25, of the effects of quantity and type of bonding materials and mold density on hot tearing.

More AFS Convention Program Personalities

W. A. Spindler

G. E. Spangler

V. Paschkis

J. Sutherland

C. B. Williams

H. Rosenthal

F. R. Smith

F. D. Keller

M. K. Young

J. A. DeHuff

A. J. Carah

A. G. Slachta

L. E. Emery

H. Mansfield

J. W. Estes

R. E. Morey

W. B. George

C. M. Adams, Jr.

Fig. 1..Removing cast iron gutter from die press machine.

R. S. M. JEFFREY/ *Director*
Federated Foundries, Ltd.

Light Iron Castings

and the new DIE PRESSING PROCESS

■ The founding of castings for the building trades comprising the production of pipes, pipe fittings, gutters, baths and cooking appliances is one of the oldest of the crafts. Man took an interest in his habitation and food prior to concentrating on weapons to destroy them. Evidence shows that it was practiced first by the Chinese. It appears, however, to have been unknown to the Romans, though several iron bloomeries were operating in England during the Roman occupation. The first products of early Sussex iron foundries were grave slabs, chimney furniture, and cooking utensils; later, pieces of cannon and other engines of war. The earliest example of a cast iron grave slab bearing a date, to be seen at Crowhurst Church in Surrey, was cast in 1591. Cast iron cannon were being made at the beginning of the 16th century.

In modern times, the first significant advance in iron founding was the successful application of coke to the smelting of iron introduced by Abraham Darby, the elder, at the beginning of the 18th century. In his foundry at Coalbrookdale in Shropshire, he began by producing cast iron hollow-ware from sand molds. Expanding activities and fortunes of the firm were closely associated with the Industrial Revolution, which established cast iron as the leading engineering and structual material for the greater part of the 19th century.

Other foundries followed the Darbys in the production of light castings, notably the Carron Ironworks near Falkirk, which acquired a reputation for its domestic stoves and grates and numbered the Adam Brothers among its designers. Isaac Wilkinson, father of the more famous John Wilkinson (co-inventor of the cupola furnace and the man who perfected the cast cylinder for Watt's steam engine) was engaged in the 1730's in pot founding. It is told how at Lindale he carried the molten metal from the blast furnace across the road to his foundry. These are only a few of the better known names among the many iron foundries which sprang up all over the United Kingdom—in the Midlands, Yorkshire, Derbyshire, Lancashire, South Wales, and Scotland—during and subsequent to the Industrial Revolution.

Many foundries were engaged on government contracts during the American and Napoleonic Wars.

When these contracts came to an end, foundries frequently turned their attention to the production of a variety of household and builder's castings. In particular, the Scottish light castings industry originated during this period. By the middle of the 19th century, castings were applied to every imaginable use in building: gates, railings, verandas, treads, and risers, complete stairways, columns, windows, pipes, rain-water goods, manhole covers, heating and cooking stoves, baths, mantels, and, in addition, a wide range of ornamental uses frequently executed in the worst possible taste owing to the vulgarization in design which coincided with the greatly increased production.

One other development of importance to the light castings foundries took place in the 18th century—the art of enamelling. This was of German origin; there is evidence that acid-proof enamelled castings for stoves, cooking utensils, and chemical ware were being produced in Wurttemberg in 1764. In 1799, a patent was granted to Samuel Hickling of Birmingham, England, "to improve and beautify certain vessels and utensils used for chemical, culinary, and various other purposes,

What's New in Light Iron Castings

Die Pressing Process for gutters and other castings produces low-cost, gray-as-cast iron in mechanized permanent molds.

It's one of the outgrowths of post-war castings demands and manpower shortages.

Other developments: improved working conditions . . . grinding dust control . . . cupola emission control . . . fluidity . . . enamel blistering . . . mechanization.

made of hammered iron or cast iron . . . by lining or covering them with . . . vitreous compounds." Thus, the foundations of a new industry were laid, leading to the wide-range of brilliant enamel finishes on cast iron that are available today.

Reference has been made to the work of the Adam Brothers in casting design; the home presented President Eisenhower at Culzean Castle in Scotland owes much to their skill. Rebuilt in 1777 by Robert Adam its iron staircase and fireplaces are excellent examples of the style in design which they made famous. Reference has also been made to the extreme bad taste in design which followed. This, coinciding with greatly increased production, was possibly due to too much sudden wealth. In recent years, however, much greater emphasis has been placed on good design and with the advent of the industrial designer working with the technical staff many newer appliances are, though mass produced, first rate both in appearance and efficiency.

Working conditions in light casting foundries have been greatly improved in recent years. The report of the Joint Advisory Committee on Conditions in Iron Foundries, issued in 1947 (generally called the Garrett Report) was sympathetically received by all parties interested in the industry. Eating and washing facilities have been provided in many foundries. Much thought has been given to evolving the best working conditions, particularly in regard to ventilation, dust, and fume.

Improvements in working conditions are the results of combined efforts of equipment manufacturers, production planning engineers, and operatives. The ventilating engineer presumes that dust is airborne and susceptible to the flow of exhaust air. The foundry equipment manufacturer has the advantage that dust is not dispersed until his machinery is set in motion; his ingenuity can be directed to evolving machines of new designs that will keep sand moist, will not generate dust, or, at worst, will not disperse dust beyond the equipment enclosure. The foundry planning engineer cooperates with the foundry equipment manufacturer by providing facilities for the ventilating engineer to install hoods and ducts to catch dust close to the point of origin.

The results of two specific projects investigated by the British Cast Iron Research Association Foundry Atmospheres Committee provide a useful contribution to solving the foundry dust problem.

Pedestal Grinder. W. B. Lawrie, of the Inspectorate of Factories, showed the conventional method of controlling dust produced by a pedestal grinder to be ineffective. He showed, by means of motion picture films taken while the dust was illuminated with powerful lamps, that a high velocity dust-bearing air stream moved upwards into the breathing zone of the operator. Speeds and directions of dust-bearing air streams set in motion by the wheel of a pedestal grinder were measured. Results indicated that high velocity air streams were deflected by the casting towards the body of the operator, which re-directed them upwards and into the breathing zone. Fortunately, results indicated that while air velocity was almost 1000 fpm at the base of the bodyline, it rapidly diminished to about 50 fpm so that control by entrainment in exhaust air streams was possible at a point below the face of the operator.

A vortex above the leading edge of the wheel cowl revealed that the volume of air entrained by the wheel created a zone of low pressure above the cowl into which air flowed from all directions, including the breathing zone. It was therefore apparent that this position could be employed to exhaust sufficient air to increase deflection started by the low-pressure zone and control dust-bearing currents moving up the body, ensuring that only replacement air from the general body of the shop was moving through the breathing zone of the operator. The advantage of this system of external ventilation is that its effectiveness is independent of the gap between the cowl and leading edge of the wheel.

Collection of Cupola Dust. The emission of dust and fumes from the cupola increases the dust concentration in air around the foundry, raises the cost of cleaning and repairing foundry roofs, and is anti-social. Estimates and tests indicate that 10 to 50 lb of solids per ton of metal melted are emitted, and that the quantity is affected by such factors as coke-metal ratio, sand on the pig iron, ash in the coke, and gas velocity.

It is difficult to assess the efficiency of dust arresters

on an absolute basis, but comparison of performance records indicate that the quantity (by weight) of particles over 150 microns in size collected is about 20 per cent for a pent-house type construction with the expansion ratio in the order of 1 to 200, and 5-15 per cent for a common type of expansion-deflection chamber having an expansion ratio of about 1 to 2 or 3. The wet-type of dust arrester, which has been the subject of development and improvements by Buchanan, shows efficiencies of 40-70 per cent and possesses the advantage that water sprays also extract some of the basic sulphur content of the coke.

In view of the foregoing test results and the necessity of developing relatively inexpensive equipment, the Foundry Atmospheres Team has evaluated, and cooperated in the design of, a number of wet-type dust suppressors with particular emphasis on methods that recirculate and are therefore economical in the use of water. A typical arrester of this type fitted to a 24-in. cupola melting two tons of metal per hour was found to collect 16 lb of dry solids per ton of metal, with a water recirculation rate of 167 gpm.

For various reasons technical investigation in the light castings foundry has lagged behind other sections of the foundry industry leaving problems more specifically related to light castings unsolved. The Light Castings Sub-Committee of the British Cast Iron Research Association recently directed attention to two of these problems—anomalies in fluidity and enamel blistering. While the investigations of these problems have been fully reported in the Association's *Journal*, a resume of this work is worth recording here, because it has resulted in the clarification of our knowledge.

Anomalies in Fluidity. Under certain circumstances it had been claimed that metal of apparently constant composition and temperature was sometimes more fluid than others. The first stage of the work involved developing a test piece capable of giving reproducible results. Using the test piece, it was found that, in general, only total carbon, silicon, and phosphorus contents and pouring temperature affected fluidity; pouring temperature had, by far, the greatest effect. A formula was evolved whereby relative fluidity of cast irons could be determined:

$$CEF = Si/3 + P/2 + TC$$

where CEF means "carbon equivalent based on fluidity." All irons of similar CEF value at similar temperatures possessed the same fluidity properties. Increasing pouring temperature 14-17 had an effect similar to increasing the CEF value by 0.10. Small concentrations of sulphur, nickel, and chromium had little or no effect on fluidity.

It has been shown by Portevin and Bastein (*Journal of Institute of Metals* vol 54, 1934, pp 54-58) that fluidity varies indirectly with the freezing range and is, therefore, greatest for pure metals and eutectics. In the case of cast iron, however, the fluidity of hypoeutectic materials increases as the eutectic (4.3 carbon equivalent) is approached; and fluidity continues to improve up to approximately 4.75; but beyond this fluidity falls rapidly. This point has obviously been realized in the light castings industry as many compositions used without complaints of poor fluidity have carbon equivalents of 4.5-4.6.

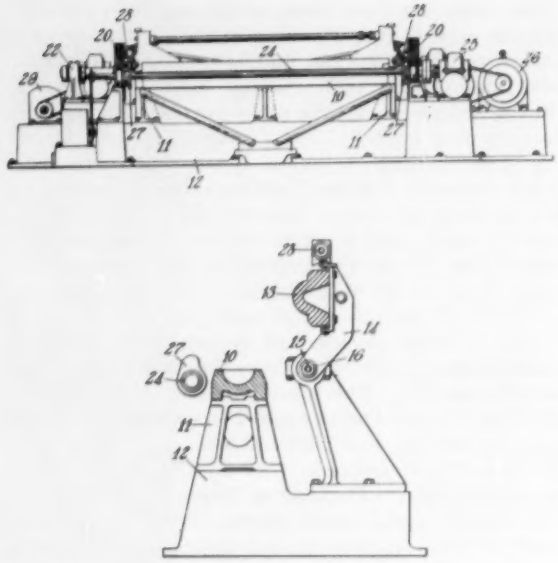

Fig. 2 . . Front and sectional end view of die press machine with dies open.

The CEF value should not be confused with the CE value. Whereas CEF is useful to calculate the relative fluidity of cast irons the CE value is to calculate how near a particular composition is to that normally accepted as eutectic composition. Increasing CEF value denotes increasing fluidity only up to a CE value of 4.75, whereas the CEF of maximum fluidity varies with the phosphorus content.

The fall of fluidity in hypereutectic irons is thought to be due to the precipitation of primary graphite (kish) which interrupts metal flow. If this graphite is in flake form the interruption is most serious but if in nodular form, as in magnesium or cerium treated iron, the interruption is less serious and better fluidity is obtained.

It has often been stated that under certain conditions so called "oxidized" iron is produced from the cupola. This iron can result from low coke bed, over blowing, and/or the use of badly rusted scrap in the charges; and, although apparently of the same composition and pouring temperature, has poorer fluidity. Experiments on "oxidized" metal showed that a metal of poorer fluidity was produced. Analysis showed, however, that the actual fluidity was that which would be expected on consideration of composition and pouring temperature and that the poorer fluidity could be explained entirely by lower pouring temperatures and lower carbon and silicon contents. Although the production of "oxidized" metal has no unusual effect on fluidity there may be an effect on the emissivity of the surface that allows the metal to appear hotter than it actually is.

There has been a tendency in the industry to regard phosphorus as the major fluidity promoting element, but the result of this work directs attention to the more important element, carbon, and to the major effect of pouring temperatures.

Enamel Blistering. Many of the light castings produced, particularly for stove and grate work, are vit-

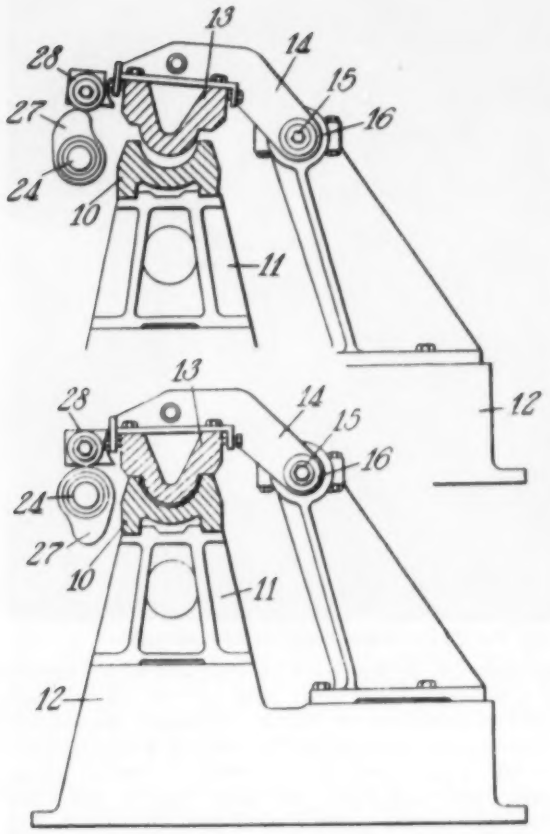

Fig. 3 . . Shows dies and cam action with dies partially closed (upper) and closed (lower).

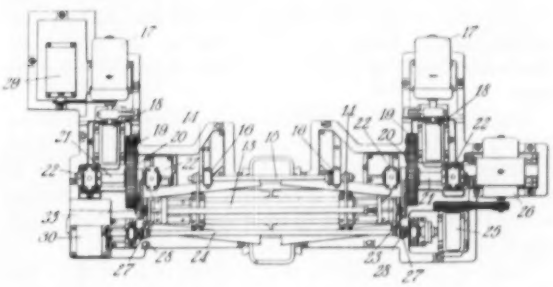

Fig. 4 . . Top view shows motors and reduction gears.

reous enamelled. Surveys have shown that the process is not always completely successful and defects occur which warrant the reprocessing of many components. Whereas in certain cases the causes of these defects are obvious, in others they are obscure and no flaw in the casting could have been detected by visual means prior to enamelling. In general, defects of the former group can be reduced by improved foundry control and pre-enamelling inspection. Defects of the latter group normally take the form of blisters and their developments, pin holes and black specks.

Blistering is caused by gas evolution from the vicinity of the iron-enamel interface. These gases are known to be predominantly oxides of carbon. In certain cases

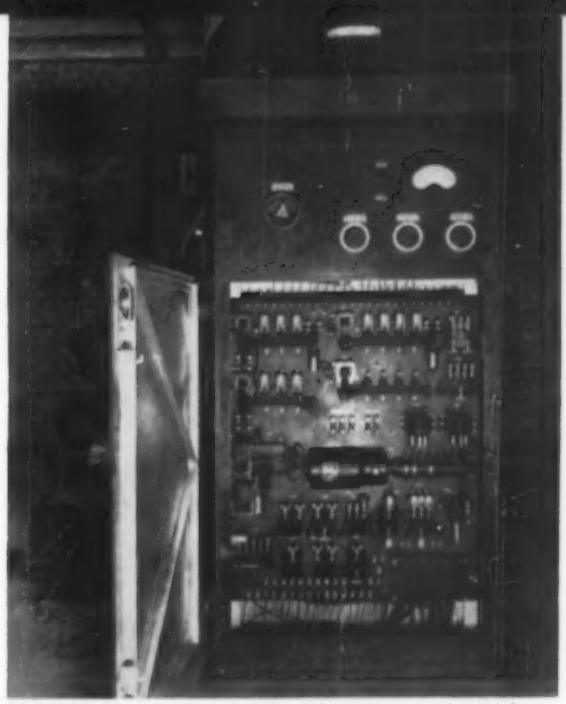

Fig. 5 . . All speeds are adjustable at control panel.

subsurface defects have been detected in the castings beneath severely blistered areas, and these defects have one thing in common, namely the presence of oxides. The defects originated by various mechanisms such as inclusions of sand or slag, kish and other forms of coarse graphite, but during cooling in the mold, annealing, where carried out, and storage, oxygen has penetrated in their region. During the enamel fusing process the oxides formed react with carbon evolving gases.

Surface machining or grinding of castings has been claimed to improve results, but whereas this treatment will remove the source of "boil" by removing sub surface defects, general blistering may still occur. It is thought that the mechanism of formation of gases causing blistering of enamels on apparently sound castings is as follows:

When gray cast iron is heated in air oxidation occurs, and at temperatures up to the order of 1256 F (680C) carbon and iron oxidize side by side, but above this temperature carbon oxidizes preferentially to iron. Thus in the enamel fusing cycle where the enamel "biscuit" is porous up to temperatures of the order of 1112 F (600C) but then seals the castings from the atmosphere, direct atmospheric oxidation can occur only up to approximately 1112F (600C). Up to this temperature gases will be evolved by the direct oxidation of carbon and at the same time some iron oxide will be formed. Oxidation will cease when the casting is completely sealed, but above 1256 F (680C) carbon will react with the iron oxide to give further evolution of gas. This gas bubbles through the enamel and the bubbles will remain as blemishes on the finished component unless: (a) they are so small as to be undetected by the eye, (b) the reaction ceases because all the iron oxide in contact with graphite is used up and the craters heal over, or (c) the viscosity of the enamel is such that during cooling, sufficient mobility is retained to heal over blister craters as they form.

The temperature cycle during enamel fusing is therefore of great importance. Although it is always danger-

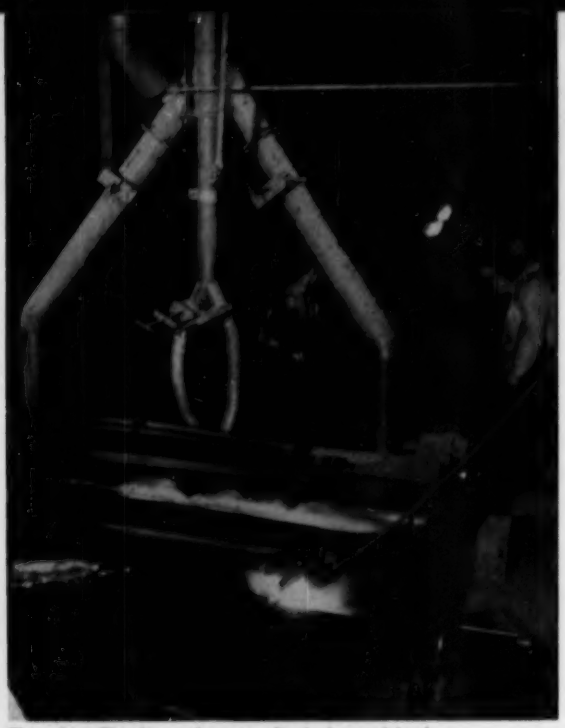

Fig. 6 . . Final coating on die is lamp black.

Fig. 7 . . Cupolas are mechanically charged.

ous in problems of this type to base conclusions on small scale experiments, it has been shown that castings can be enamelled with greater success in continuous furnaces than in box muffles.

The rate of heating is important because this determines the amount of oxidation which can occur before the enamel seals the castings from the atmosphere. Although rapid heating shortens the time available for oxidation, it should be remembered that the nature of the enamels is such that the temperature of complete "sealing" depends upon the rate of heating and will be highest when the rate of heating is most rapid. Slow cooling, and with this is associated holding at the required temperature, on the other hand is always to be preferred because the enamel remains fluid for the maximum possible time enabling all the gas to escape and the craters formed to heal over. Thus although the value of continuous furnace practice is obvious on consideration of the cooling cycle, it is difficult to be certain whether the slow heating on this type of furnace is to be preferred to the rapid heating in box muffles.

Other factors than fusing cycle also have a bearing, and probably the most important of these are the size, form, and distribution of graphite, since when oxidation occurs the depth of penetration below the surface is determined by the nature of this constituent. It may well be that with one type of graphite rapid heating is to be preferred but that with another type slow heating is advantageous. Control of graphite is extremely difficult since it is influenced by many things not always easily controlled in the foundry. Not least among these are small quantities of so-called residual elements in pig iron hitherto considered unimportant.

Mechanization in the light castings industry is comparatively new in Great Britain. A quarter of a century ago all production was by loose pattern or plate molding, except in a few isolated instances where hand-operated machines were used.

In 1930 large scale developments took place in the foundries of the motor car industry and their example was followed a few years later in some of the light castings foundries. In 1932 a continuous, mechanized plant was installed in one foundry for the production of rain water bends and connections. Similar plants were introduced about the same time in two other foundries for the production of gas cooker parts. The development in the industry was, however, very slow, since at that time a severe trade recession was in progress and capital for development was very limited due to low profit margins. Another argument put forward for the retention of hand molding methods was the fact that ample skilled labor was available at the time and reasonable rates of production were obtained from the men.

During World War II most of the younger men in the foundry industry were drafted and in 1945 the light castings industry was left with only a small force of elderly skilled men to cope with a rapidly expanding order book, which had to deal quickly with war damage and an extensive rebuilding program.

Some of the foundries were fortunate since they had turned over to mortar bomb and cast steel track link production during the war which required a considerable amount of mechanization. These units were quite readily converted to peace-time production which allowed unskilled labor to be used to a considerable extent. Many other foundries rapidly followed suit and a large proportion of the work was organized on a mechanized or semi-mechanized basis.

While these developments have been extensive in some foundries, particularly in the case of gas and electric cooker manufacture, there is a definite limitation to the developments which can take place in the other light castings foundries, mainly due to the variety of work being produced and the seasonal nature of the trade.

Apart from the development of pressed cast iron gutters, a number of foundries have, or are, in the process

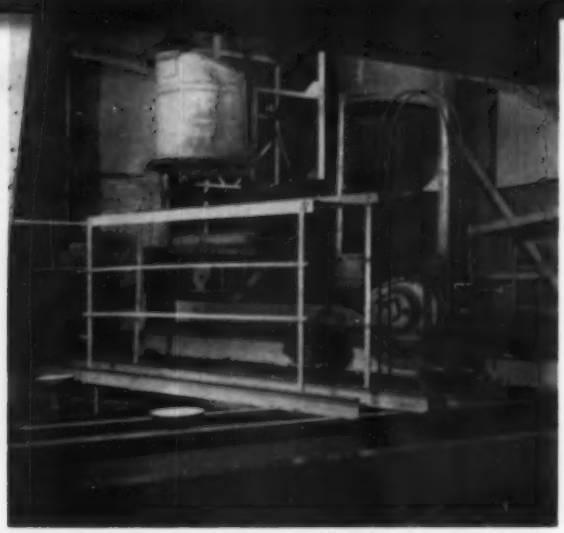

Fig. 8 . . Cupolas are operated to give hot metal.

of introducing spun pipe plants to deal with both soil and rain water pipes. A few foundries already are producing these pipes by slinger methods with four in a flask, the principle being to use a turntable with three or four stripping machines to one slinger unit.

Little or no development has taken place in the light castings industry with shell molding, since apart from the heavy cost of raw materials, the argument put forward is that equally good results can be obtained with sand molding, provided care is taken to maintain flask parts and have accurate sand control.

The bulk of flat plate work which has been mechanized is being produced on plain squeeze, electric molding machines. These machines have been found to give very good results and high rates of production. Much of the smaller work is developed along the lines of snap flask molding and while a few foundries have experimented with the metal, quick-release type of flask, most of the foundries tend to retain the conventional type of wooden snap flask. Another development—the flaskless type of hydraulic molding machine is expected to replace snap flask molding to a large extent.

Certain information concerning some of the light castings foundries has been collected over the last four years by the Operational Research Team of the British Cast Iron Research Association. Table I shows that the output per operator per annum for stove, grate, and rainwater goods production is 30.8 tons, whereas gas and electric cooker production is at a rate of 25.6 tons. These figures compare very favorably with the output from all classes of foundries (excluding ingot mold foundries), which averages 22.0 tons per man per annum. It is also interesting to note that over 50 per cent of gas and electric cooker production is on power operated machines, whereas the percentage drops to close to 20 per cent for stove, grate, and rainwater goods production. The latter foundries do, of course, produce other types of castings making an accurate comparison difficult to obtain.

Die Pressing Process. Following is a brief summary of the die pressing process first described in detail in a paper given by J. A. Richards and the author to the I.B.F. Conference in June 1954.

Faced in 1945 with a large demand for cast iron gutters, it was apparent that due to the lack of skilled molders a new production method was called for. Mechanized sand molding was considered. Due to the high cost of handling the large quantities of sand for gutter production, this method of manufacture was ruled out and experiments were started on manufacture by permanent metal molds. Early results produced castings fractured in many places and displaying a white hard fracture. It will be understood that an annealing operation, if found necessary, would considerably raise the production cost. To overcome these difficulties, it was decided to try out a displacement process by fast moving dies, which would eliminate the use of downgates, and facilitate the removal of the gutter immediately after casting.

A short length of plain half round gutter, omitting the faucet end, was experimented with. The die consisted of two halves, hinged together, with a handle on the top die for operating purposes. Both half dies were coated with a chill dressing, heated, metal poured in, and pressed. First results were promising—under certain conditions of timing, soft gray castings free of cracks were obtained. Further trials led to the appearance of other problems and these were dealt with as follows:

Boiling of the metal in the die, producing spongy areas in the castings. By superimposing a film of carbon on the original coating, this was overcome.

Splashing. Too fast movement of the male die when in contact with the metal displaced the metal completely from some area of the mold. Conversely, too slow movement permitted solidification before the dies were completely closed. Close control of metal temperature

Table 1 . . Light Castings Production Statistics

No. of Foundries	Type	Total Annual Tonnage	Range, Annual Tonnage	No. Men, 44-hr. Week	Average Tons per Man per Year	Range, Tons per Man per Year	Produced by, per cent						
							Loose Patterns			Match Plate	Hand	Machine Power	Slinger
							Heavy	Medium	Light				
19	Stove, Grate, Rain-Water Goods	60,078	352 to 6183	1952.4	30.8	12.4 to 53.1	0.25	19.95	7.65	40.56	3.28	21.48	6.83
5	Gas and Electric Goods	19,210	281 to 7619	749.9	25.6	17.6 to 32.8	——	0.42	1.58	44.79	0.42	52.79	——

and composition, also die temperature and operation, eliminated these defects.

SLAG INCLUSIONS. As no slag trap could be provided it was essential to pour 100 per cent clean metal.

From these experimental observations on the first set up, larger dies were introduced and a full gutter was attempted. At the same time production speeds were increased which resulted in still further problems, particularly:

OVERHEATING THE DIES. It was found necessary to introduce cooling on both dies.

BENDING OF DIES. Distortion and expansion of the dies due to heat was controlled on the bottom die by the rigid construction of the base, and on the top die by a superstructure comprising a system of tensioning bars.

Machine Description. It was soon realized that before a 6-ft die could be made to work satisfactorily, the machine would have to be power operated and automatic, with accurate means provided to control timing. The male die weighing 450 lb would need to travel from the wide open position to a point just above the level of the molten metal in the female die in about two seconds. It would there stop, then continue at a controlled rate until the dies were fully closed, when the location of the two dies, relative to each other, would need to be very accurate. Electric control was introduced, using a pivoted male die and a cam device. The machine itself is simple; the complicated part is the control panel.

Must Air Cool Dies

Figure 2 shows a diagramatic front view of the machine and a sectional end view—the dies being in the open position. Figure 3 shows the operation of the cam shaft. The cam is shown in its up position receiving the cam rollers mounted on the radius arms just before the male die contacts the metal contained in the female die, and in the fully closed position.

Figure 4 shows the arrangement of the driving arms, reduction gears, and motors. The design of the machine was controlled to a great extent by the pouring arrangements found necessary. As metal could only be poured into the die in the direction of the longitudinal axis it was necessary for the top die to be open about 90° in order to position a hand ladle for pouring. The size of the motors, 4 hp, was determined more from the weight of the moving die and the torque required to lift it, than the force and pressure required in the metal displacement. In the closed position the motors provide some pressure, additional to the weight of the die, which prevents excessive phosphide extrusion on the gutter. In this closed position the cams leave the rollers on the radius arms, so that the full pressure of the top die, together with the power from the motors is applied to the casting during solidification. An air cooling system on both dies was found necessary when producing at the rate of one gutter every 90 seconds. After the gutter has been pressed it is manually lifted from the female die and placed in the clamping device where it cools, during which time an operator knocks off the flash formed at the joint face of the dies.

The die material is an inoculated iron that gives an average life of 40,000 castings from a set of dies.

In addition to controlling the movement of the die as already described, it was found necessary to provide a safety arrangement, so that the male die could not

Fig. 9 . . Drum and hand ladles transfer metal to dies.

enter the metal in the female die at an uncontrolled speed, and also to give indications to the operator when the pressed casting should be removed. Each of the motors driving the die is equipped with an electromagnetic brake. A suitable electrical interlock is provided which makes it impossible for the die to move down unless the cams are in their correct position.

A 1 hp variable speed DC motor drives the cam shaft. The die motors are stalled to maintain full pressure on the gutter casting during solidification, then reverse and return the male dies to its normal open position. A signal light indicates the time for removal of the casting from the female die. A second signal light comes on after a further interval. This interval allows the die temperature to stabilize and the die to be recoated ready for commencing the next cycle.

Figure 5 shows the control panel designed so that a single push button sets the machine in motion to carry through a complete operational cycle. All speeds are adjustable from the front of the housing.

Process. Dies are heated to above 392 F (200C) and an insulating coating of lamp black is applied from an acetylene flame (Fig. 6).

Modern cupolas (Fig. 7 and 8) supply metal of the following approximate composition: TC, 3.3%; Si, 2.6%; P, 0.8%; Mn, 0.5%; and S, 0.1% max. Metal has correct fluidity and temperature greater than 2372 F 1300C *in* the die.

Figures 9 and 10 show the drum and hand ladles used to ensure clean metal. Under certain conditions slag is formed in the die due to the oxidation of the constituents of the iron. The result, depending on temperature, is a solid or liquid slag-like material composed of silicon, manganese, and iron oxides. These reactions do not take place at random, but certain reactions take place preferentially at certain temperatures. When carbon is oxidized the product is gaseous and escapes and does not contaminate the surface of the metal, but the oxidation of the other constituents gives a solid or a liquid slag-like material. This slag forms on the surface of the iron and may be reduced by the carbon in the iron, depending on the temperature, according to the following reactions:

$$SiO_2 + 2C = Si + 2CO$$
$$MnO + C = Mn + CO$$
$$FeO + C = Fe + CO$$

Each of these reactions is reversible, tending to the right at high temperatures and to the left at low temperatures. Above a certain temperature, which is char-

Fig. 10 . . Die will close soon as ladle is removed.

acteristic for each composition, they proceed entirely to the right, and any oxide or slag originally on the surface of the metal is reduced by the carbon of the melt, giving carbon monoxide, and returning silicon, manganese, or iron to the melt. Under these conditions the surface of the melt rapidly becomes clear.

The temperature at which the surface will remain clear is dependent on the metal composition, and obviously, the higher the silicon and manganese contents of the metal the greater will be the amounts of SiO_2 and MnO in the slag film. It has been found that if the elements silicon and manganese are kept to a minimum, having regard to their other necessary functions, and the temperature of the metal maintained above 2372 F (1300C) up to the time of pressing, the amounts of SiO_2 and MnO formed can be kept at a minimum. As a further precaution, the operator quickly skims the metal surface before pressing. Figure 1 shows the casting being removed.

Examination of gutters cast by this process shows that tensile strength and hardness are very satisfactory, and shock resistance is superior to sand castings. Table 2 shows tensile strength and hardness values.

All samples examined under the microscope show a structure of fine undercooled graphite producing a close-grained gray fracture. Figure 11 shows unetched the typical undercooled graphite clusters, with small amounts of flake graphite, and etched shows the matrix to be pearlite and ferrite with the phosphide eutectic in a fine network.

Morrogh and Williams, in their paper on graphite formation in cast iron, confirm the work of J. T. Eash who found that undercooled graphite structures solidify white and subsequently decompose to give undercooled graphite after solidification. It would appear reasonable to assume that this is the explanation of the gray casting obtained by the new die pressing process.

While this process was developed primarily for the production of gutters, it has much wider aspects and

Table 2 . . Strength and Hardness of Gutters

		Test Piece, in.		Tensile, psi	Brinell
		Width	Thickness		
Type A	1	0.482	0.184	33,400	243
	2	0.444	0.157	36,600	265
	3	0.473	0.201	35,000	261
Type B	1	0.551	0.118	43,000	270
	2	0.552	0.136	41,800	267
	3	0.540	0.140	43,000	265

Fig. 11 . . Gutters contain undercooled graphite clusters in pearlite-ferrite matrix: unetched (upper), picral etch (lower), both X100.

possibilities and these are now being pursued. Process and machine patents have been granted in the United Kingdom and elsewhere, and have been applied for in the U.S.A.

Acknowledgments. The author wishes to thank staff members of the B.C.I.R.A., Messrs. Woodward, Bamford, Evans, and Hunter, who provided information on the various aspects dealt with for which they are responsible in the association's work. I also wish to thank the directors of Federated Foundries Limited for the encouragement and assistance given in the development of this die pressing process, and for their permission to publish this paper.

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J. T. Eash, "Effect of Ladle Inoculation on the Solidification of Gray Cast Iron," TRANSACTIONS, AFS, vol. 49, pp. 887-910 (1941).

Written discussion of this paper, Convention Preprint No. 55-35, should be sent to American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. The paper is one of 14 to be presented at the gray iron sessions of the AFS Convention in Houston, May 23-27, 1955.

Fig. 1 . . 1000-kv x-ray unit in position to radiograph a casting. Shop also has 250-kv unit.

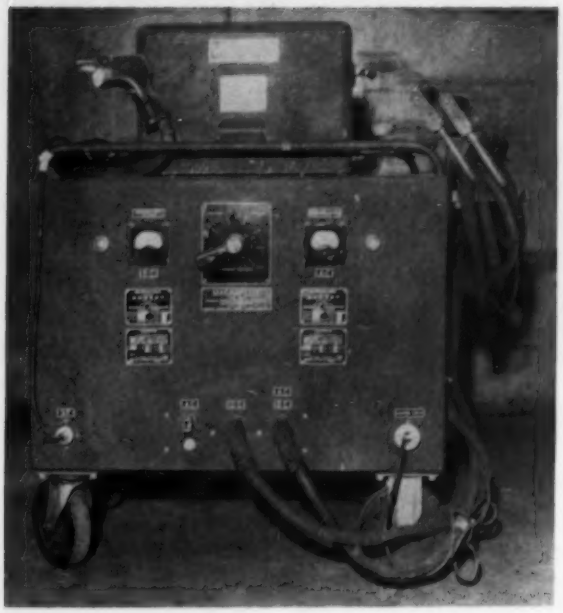


Fig. 2 . . Portable magnetic powder inspection equipment is readily moved to large castings.

Improving Casting Quality

through non-destructive testing

FRANCIS H. HOHN
Metallurgist
Scullin Steel Co.
St. Louis

■ Casting quality certainly is not a new term to the foundry industry. Foundrymen are all too aware of the customer's growing demand for castings of uniform quality which will machine consistently without difficulty and meet service requirements. This concept of quality is, however, a rather elusive one and has many different facets. It is necessary to define it and then measure it.

Only one facet of casting quality will be considered, namely, soundness or homogeneity (the presence or absence of such defects as porosity, shrinkage, cracks, etc.) The level of desired soundness is assumed to be either one that has been agreed upon by the foundry and customer, or one which through experience and design studies is found satisfactory for a particular casting in service.

Non-destructive testing equipment at Scullin Steel Co. is used to obtain quantitative information about steel casting quality which is then used to evaluate factors that might be responsible for deviations from the desired soundness level.

The company pours basic open hearth castings varying in finished weight from less than a pound to about 35,000 lb. Non-destructive testing equipment consists of 250 kv and 1000 kv x-ray units (Fig. 1) and a portable magnetic particle inspection unit and a powder blower (Fig. 2).

As an example of how this equipment is used, consider shaped plate casting 3 in. thick, weighing approximately 3500 lb (Fig. 3). It was necessary to mold this with the large, flat section in the cope. Initial, routine radiographic inspection showed that varying amounts

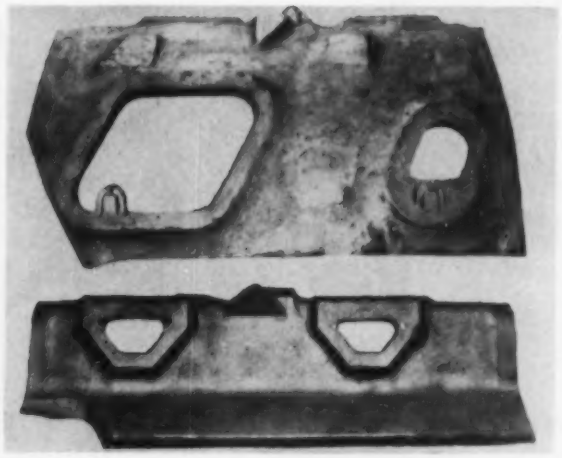


Fig. 3 . . L-shaped plate casting showed porosity.

Fig. 4 . . Radiograph of porosity in casting at left.

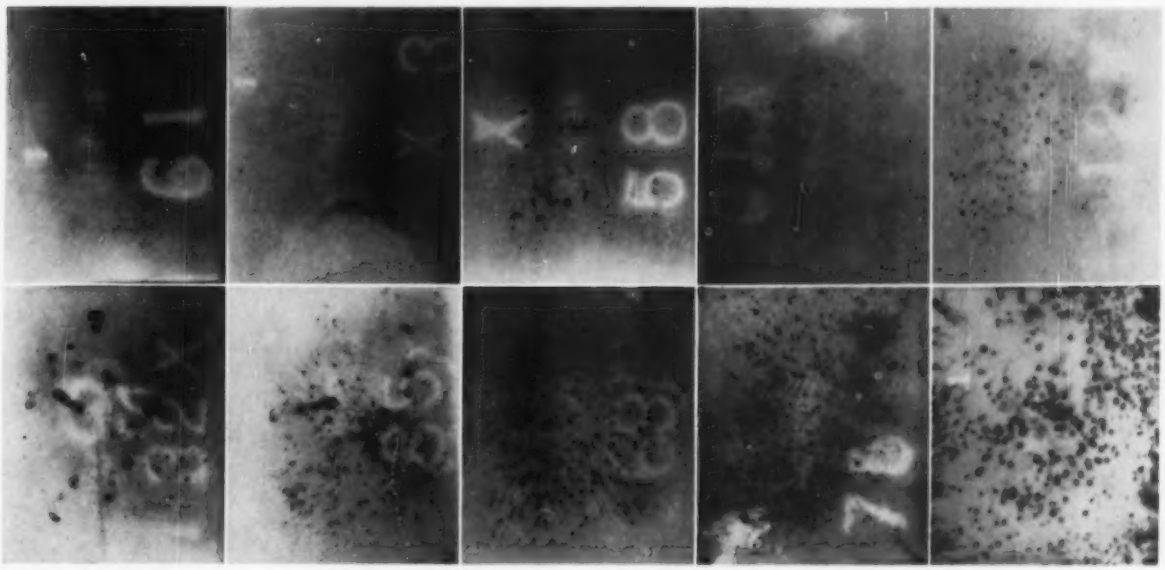


Fig. 5 . . Set of 10 x-ray standards established to evaluate porosity in 3500-lb casting (Fig. 3). Upper left is Standard I (best); lower right is Standard X (worst). Porosity was eventually related to slag FeO.

of porosity existed in this area (Fig. 4). The pilot casting had not shown these defects. However, since several machined areas were involved, radiographic examination of each casting was begun.

To study the difficulty, standard test plates and production castings poured from each heat were x-rayed. Test plates approximately 1 x 5 x 6-in. cast in core sand molds, with riser and gate on opposite edges, have been found to be extremely sensitive to the formation of pinhole porosity.

A set of ten x-ray standards were set up showing variations from the best (Standard I) to the worst (Standard X) porosity conditions found in the test plates (Fig. 5). Heats were then rated relative to standard porosity observed in the test plate. Production castings of test plate heats were x-rayed and rated as showing little, moderate, or excessive porosity (Fig. 6, 7, and 8).

Figure 9 shows that this type of test plate may be used to gauge the amount of porosity expected in production castings. In other words, when test plates of a particular heat met Standard X, production castings of the same heat showed excessive porosity. When the test plate met Standard I, very little, if any, porosity was found in the castings.

Check Responsible Factors

Once a numerical rating had been applied to this type of casting soundness, it was just a question of looking for the factors responsible for quality variations. It was discovered that iron oxide content of the tap slag correlated significantly with casting soundness. Figure 10 is a plot of the average slag iron oxide content for each standard of porosity as found in a large number of test plates. The range of iron oxide contents for various heats was found to be from 8.0 to 17.5 per cent. It will be noted that as iron oxide content of the

Fig. 6 . . Plate casting showing little porosity.

Fig. 7 . . Moderate porosity in problem casting.

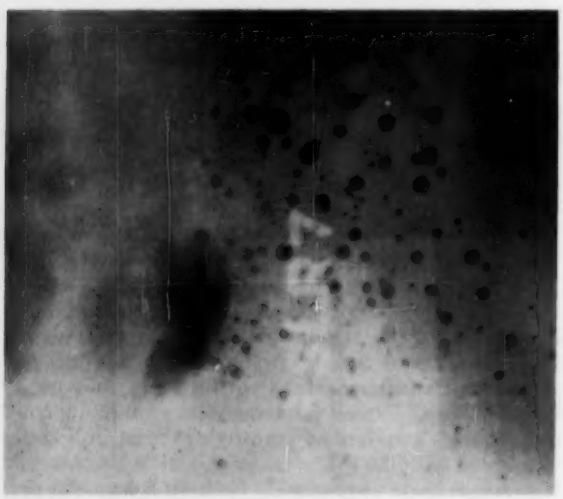


Fig. 8 . . Radiograph showing excessive porosity.

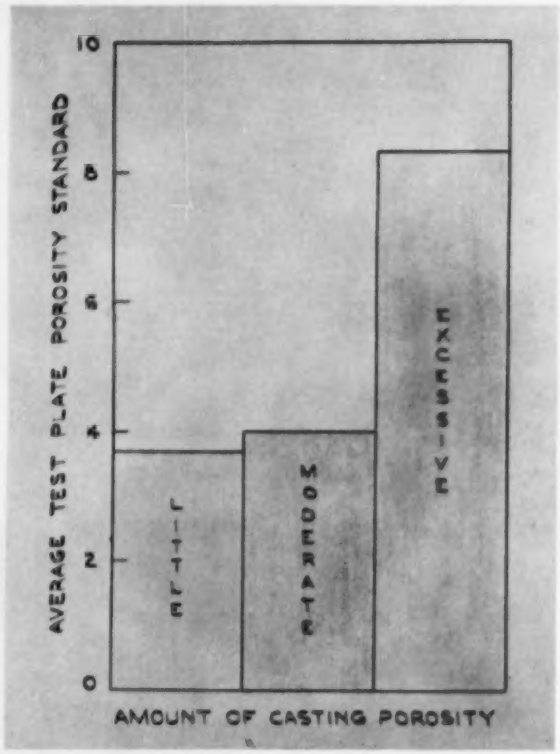


Fig. 9 . . Porosity relation between tests and castings.

If you are interested in high-level casting quality, you must be interested in non-destructive testing. Non-Destructive Testing Symposium will be held May 27 during the AFS Convention in Houston.

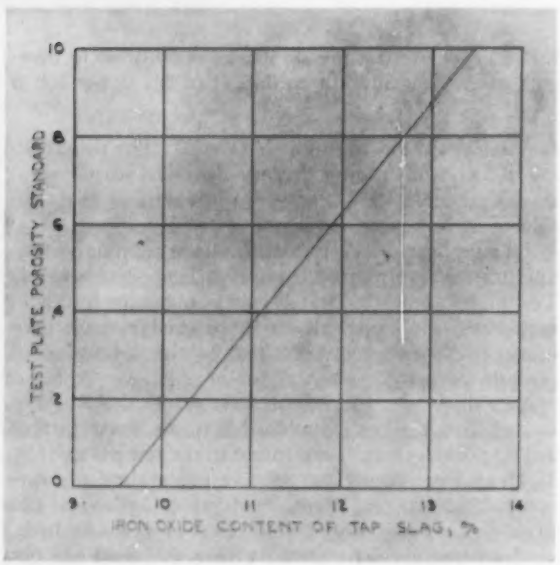


Fig. 10 . . Porosity and FeO in slag correlated.

Fig. 11 . . Turret casting had centerline shrinkage.

Fig. 12 . . Location of shrinkage on 15,000-lb turret.

Fig. 13 . . Turret radiograph, shrink rating—0.

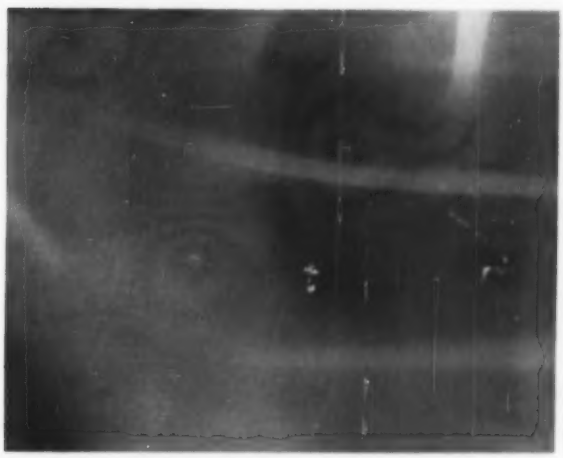


Fig. 14 . . Shrinkage rating of 3-in. turret.

tap slag increases, the amount of pinhole porosity in the test plate increases also.

By aiming for the lower iron oxide contents in the open hearth, with all other factors remaining approximately the same, it was possible to keep plate castings within quality requirements. This isn't meant to imply, however, that all pinhole porosity can be traced back to melt conditions; there are many complex and interacting variables in the foundry.

Establish Soundness Rating

A turret weighing about 15,000 lb with an average thickness of about 4 in. had localized centerline shrinkage that varied in size from casting to casting even though molding procedure remained the same (Fig. 11 and 12). All castings were x-rayed in the area in question and given an arbitrary soundness rating from 0 to 4 depending upon the severity of the defect (Fig. 13 and 14). When sufficient data had been accumulated, correlation with likely foundry variables was attempted. Figure 15 shows the shrinkage defect to be directly related to tapping temperature. Note that at tap temperatures of about 2970 F, shrinkage is at a minimum, while at 2825 F, it is at a maximum.

Because all areas of the turret to be machined must be free of crack and tear defects, more than 15 machined areas as well as other critical non-machined areas are carefully inspected by magnetic particle meth-

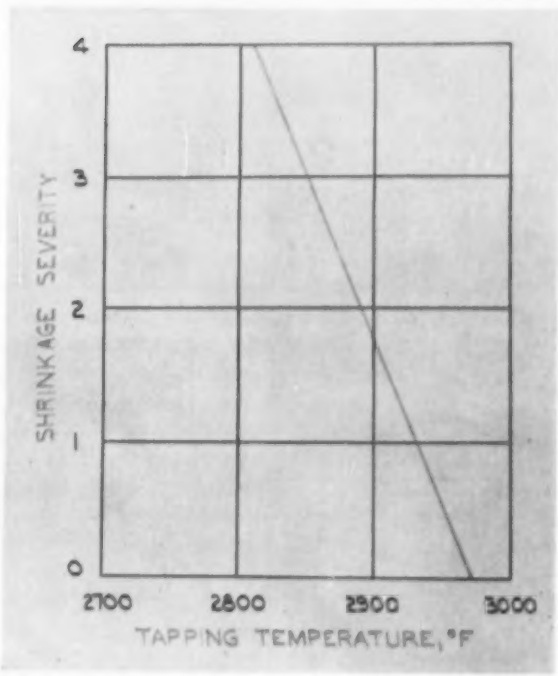


Fig. 15 . . Proper tap temperature eliminated shrink.

Fig. 16 (left) . . Magnetizing section of turret casting to locate cracks. Line in casting between prods is not the defect sought by inspectors.

ods soon after the casting is normalized (Fig. 16). Significant defects are marked for removal. The areas are checked by magnetic particle inspection during defect removal and again after welding to be sure that repair is satisfactory.

Accurate daily records are kept of the number and location of crack-like defects. Figure 17 illustrates work sheets used with magnetic particle inspection of turret castings. Data is logged, then used to prepare statistical quality control charts (Fig. 18). Each point on the control chart represents the number of crack-like defects found in a particular casting. Upper and lower control limits based upon a lot of 20 castings form the probable boundaries within which all points should fall. The center line is the mean or average line, about which all points should cluster. Deviations in normal process quality are indicated by points approaching or crossing the control limits. Charts are kept for each machined area as well as for the casting as a whole (shown here).

Calculations Not Difficult

Calculations involved in construction of quality control charts are not particularly difficult. Control charts are extremely useful for early detection of variations from normal production quality. They also show the results of improved production techniques.

The turret casting with its many section changes and complicated gating and risering is subject to quite a bit of hot tearing. The sample quality control chart (Fig. 18) shows a gradual reduction in the number of hot tears, determined by magnetic particle inspection, brought about through judicious placement of cracking strips.

Non-destructive testing by x-ray and magnetic particle inspection methods are used to maintain a high level of casting soundness by quickly spotting and locating assignable causes for downward variations from desired quality level, and to check on improved molding techniques aimed at raising the quality level.

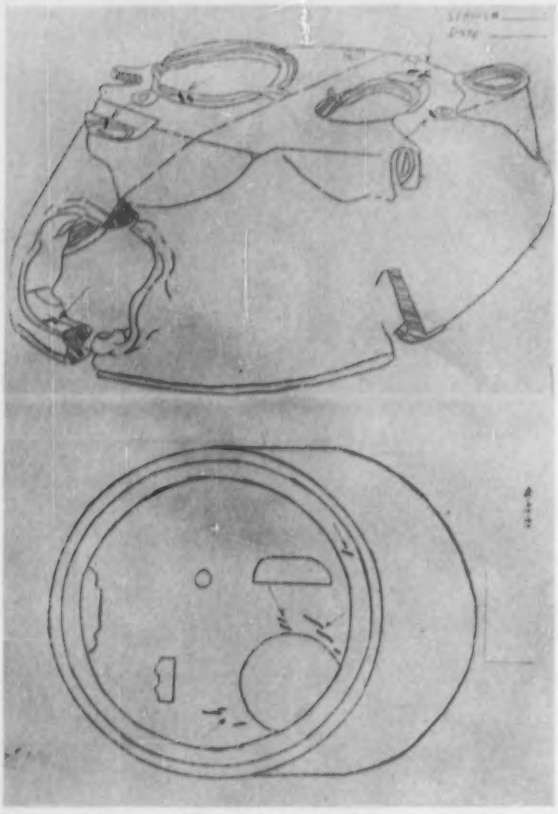


Fig. 17 (left) . . Arrows point to record of magnetic indications on sketch of cast turret.

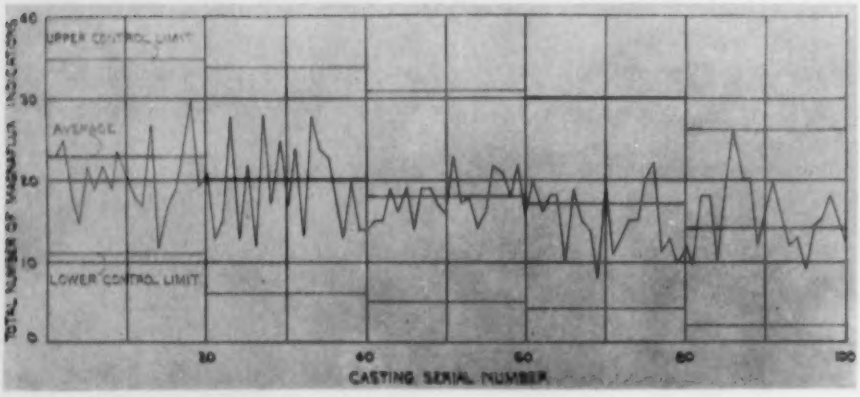


Fig. 18 . . Quality control chart prepared from magnetic particle indications records deviations from normal process quality.

RICHARD L. OLSON / *President*
Dike-O-Seal, Inc., Chicago

Stopping Blow-By in Core Boxes

■ Everyone who blows cores encounters blow-by at some time or other. And suffers along with it the attendant safety hazard, variable core permeability, expensive repair of "ratted" cores, and high box maintenance costs.

Steel and brass facings have constituted a costly means of increasing box life. On contour-parted boxes, cost of machining for such facings is almost prohibitive, so boxes are often redesigned to convert contour partings to plane faces. Result is a heavier core box which costs more, and a loss in production in most cases where boxes are manually handled.

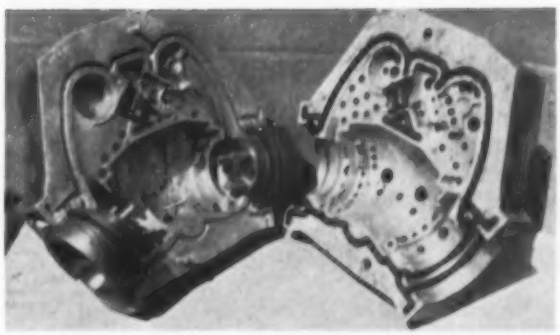
Costly off-set partings have been tried in an attempt to prevent blow-by.

Increased closing pressures have been tried and are being used, but they do not overcome the problem of sand adhering to the parting face. Increased closing pressures cause other damage such as peenage and elongation, and do not fully solve the problem of blow-by.

The core itself suffers from blow-by. To maintain consistent permeability, venting of a core box and input of the blow tubes should be in definite relationship to allow the sand to be packed with a minimum of back pressure. Boxes that are vented amply give less blow-by. When the vents become clogged and pressure in the box becomes higher, there is more tendency to create blow-by.

When blow-by occurs and erosion of the box has taken place, air escaping at the parting creates a ratting or spongy condition. This requires a costly mudding or patching operation, which in some cases exceeds the cost of making of the core. This also causes excessive fins, removal of which destroys the skin of the core, exposing its coarse inner structure and making a patching operation necessary.

As a possible solution to blow-by, the author tried



Box sealed against both external and internal blow-by.

Users of Dike-Type Blow Box Seals Report

A core box properly vented and sealed against blow-by will produce cores of consistent permeability.

Costly patching and mudding is eliminated, and minimum finning at the parting lines occurs.

Costly brass and steel facing is not necessary.

High closing pressure directly on the core box is not necessary to prevent blow-by.

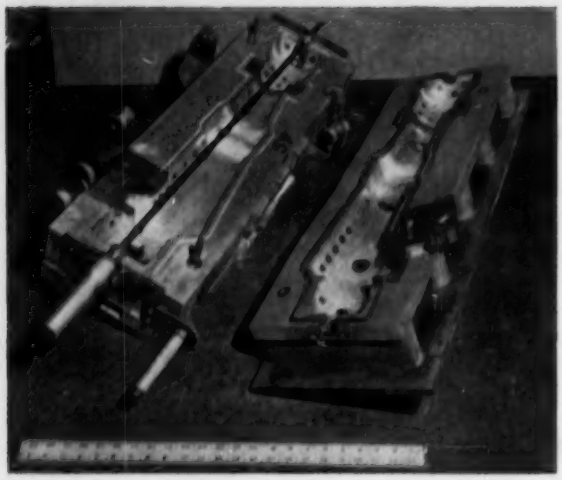
Core box damage at the mating faces is eliminated.

Lighter core boxes with contour partings, and light weight blow-in driers are now practical.

Less maintenance and less down time assures higher production.

Safety hazards due to blow-by no longer exist.

A core box properly engineered and designed with a dike-type seal costs considerably less than if fitted with a brass or steel facing, and is serviceable much longer.



Dike-type seal on long core box with loose piece (right).

various compression-type seals with but limited success. Then he conceived the idea of molding into the core box a continuous dike-type seal that would protrude above one parting face and fit perfectly into a groove in the mating face.

First experiments were made with low melting alloys (180 F melting point). The continuous barrier against blow-by was made by machining a half round or V-groove in the mating surface of the core box that has the locating pins. The groove was continuous between the locating pins and the core cavity and generally parallel to the cavity.

Opposite this groove in the other half of the core box an undercut groove slightly wider than the V-groove was machined and a hole was drilled into the groove from the back. This was a pouring hole for entry of the low melting alloy. (The undercut groove can be rough, but the V-groove should be fairly smooth.) Then a few vent holes were drilled through the undercut section.

The core box was clamped together and warmed to prevent premature solidification when the low melting alloy was poured. After pouring the alloy, a perfect tongue or dike extended above the joint of the core box, fitting perfectly into its receptacle on the other side. The low melting alloys do not shrink, but expand slightly on solidification ensuring a tight fit into the lock-in side.

This rigid dike-type seal has been installed in many core boxes where the erosion of blow-by had made it impossible to make a good core. Without any repairs to the parting faces, the seal has eliminated blow-by and produced good cores, and continued to do so for months. This showed that the dike-type seal was a solution to maintaining consistent permeability of a core, and elimination of blow-by, thereby prolonging the life of the core box.

On the assumption that the rigid material used in the seal was not doing all that could be expected, experiments with such material as plastic, synthetic rubbers, and various elastomeric materials were started. The goal set was a dike-type seal that would be molded in its own container and bonded in place, and would be compressible, pliant, and impervious to the various core box cleaners used (live steam, alkali, fuel oils, etc.). This was accomplished by using new synthetic elastomeric materials specially compounded to meet the above requirements, which when molded gave a plaint seal with a metal-to-metal contact without compression.

The new material can be bonded to the metal with an adhesion beyond the strength of the material itself, making it impossible for stray sand to work its way into the lock-in channel. Specially compounded heat resistant materials are now available that can be installed in heated core boxes.

Hundreds of core boxes using the continuous resilient dike-type seal are in use today. Core boxes that could no longer make a useable core due to erosion by blow-by have been sealed with no repair of the erosion, and have produced thousands of good cores with consistent permeability and needing no mudding or patching. Dump-type core boxes and blow plates are being equipped with the dike-type seal.

New boxes on which the dike-type seal replaced brass or steel facing have run for months longer without any repairs to the parting faces. To date, no dike-sealed core box is known to have gone back to the pattern shop for repairs to the parting faces. The pliant seal prevents air from escaping at the parting line and conveying sand with it and causing erosion. Former daily or weekly repairs have been eliminated.

Continuous dike-type seals have been installed in three and four-part boxes with a complete elimination of blow-by. The same results have been achieved in duplicate and interchangeable core boxes. Internal blow-by in single and multiple cavity core boxes has been stopped by making the seal follow the outline of the core areas.

Use of loose pieces in a blow-type core box has been a problem due to sand wedging and wearing the loose piece or its receptacle. Proper engineering and design of seal eliminates this problem.

Shim Box, Still No Blow-By

As a test of the dike-type seal's effectiveness, core boxes have been shimmed with a 1/16-in. shim at the parting. Cores were perfect but were 1/16-in. thicker; no blow-by was encountered. As a further check, rails and stops that kept the core boxes 3/32 in. short of closing were installed. To eliminate high closing pressures, 1/16-in. rubber washers were placed over the blow tubes. Perfect (though over-size) cores were made without blow-by.

Therefore, it is recommended (if a core box is sealed properly) that core blowing machines be equipped with rails or stops to prevent damage to the core boxes. Thus high closing pressures could still be used without harm. It should be noted that forging presses are equipped with stops to prevent damage to costly dies. Costly brass or steel facings would no longer be necessary, nor would the present rugged design of the core boxes be essential.

Light weight blow-in driers are now practical as they would never leak at the joints, nor be damaged by high closing pressure. The driers could be cast with the V-groove or receptacle for the tongue or dike in them, and slight variations would not be objectionable as the plaint material is highly compressible. This has been brought out by deliberately filling the groove half full

of sand, then closing the core box to get metal-to-metal contact of the parting faces with very little pressure.

Advantages of blow-in driers were given by Robert W. Wendt in an instructive talk, *"Use of Blow-in Core Driers,"* at the 58th annual meeting of AFS. (TRANSACTIONS, AFS, vol. 62, p. 427 (1954). His conclusions were:

"1. Blow-in driers for bulky or small, intricate cores are in use today and produce excellent results.

"2. Blow-in driers make it possible to hold closer dimensional tolerances; thus wall sections and machining stock can be reduced to a minimum.

"3. Blow-in driers eliminate parting line separations, and in turn parting line patching.

"4. Blow-in driers in many cases eliminate use of wire and nails for core reinforcing.

"5. Blow-in driers eliminate handling operations and in many cases reduce core cost considerably. Cores made this way fit better in the mold cavity.

"6. Precision cores make precision castings. This is what casting buyers want, but if possible, at no increase in cost. If you are a casting supplier and in need of improving core quality, it might pay to investigate blow-in drier applications."

Mr. Wendt's paper was presented before he knew of or saw the dike-type seal in operation.

Many companies are revising their present core blowing procedures, and are insisting that all new blow boxes be engineered and designed to provide for the continuous dike-type seal. Plans are being made also to use the dike-type seal on the magazines, blow plates, flasks, as well as cope and drag plates when they are used on a mold blowing machine.

Written discussion of this paper, Convention Preprint No. 55-73, should be sent to American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. The paper is one of four to be presented at the pattern sessions of the AFS Convention in Houston, May 23-27, 1955.

Eight Shop Courses Are Scheduled for Gray Iron, Brass & Bronze, Sand and Malleable

The 1955 series of shop courses gives practical foundrymen, metallurgists and engineers an opportunity to obtain answers to shop problems. Everyone has an opportunity to ask questions pertaining to his problem from the floor.

These sessions are sponsored and arranged by the Gray Iron, Brass and Bronze, Sand and Malleable Divisions, and each division has two sessions scheduled. There is no admission fee necessary to attend the shop courses.

Top men in their respective fields have been selected to be panel members and to present short papers at these several shop course sessions, and attendance will be an opportunity to improve operating procedures, increase efficiency and decrease cost.

The following is a brief résumé of the courses and the dates and locations of the meetings:

Gray Iron

The two, off-the-record, Gray Iron Shop Course sessions will be held at the Rice Hotel, Monday and Tuesday, May 23 and 24, at 8 pm. At the Monday meeting, Practical Inoculation of Cupola Melted Irons, will be discussed. Harold E. Barnum, Vanadium Corp. of America, will be the discussion leader.

Efficient Cupola Operation will be the subject of the Tuesday Night shop course session. Discussion leader will be E. H. Henley, Tyler Pipe & Foundry Co., Tyler, Texas.

Brass and Bronze

As in previous years, much useful information will be presented at the Brass and Bronze Shop Course sessions to be held at 4 pm, Monday and Tuesday, May 23 and 24, at the Rice Hotel. Molding and Cleaning Equipment for the Brass Foundry and Melting Equipment for the Brass Foundry are the subjects slated for the Monday session.

Because of the unusual timeliness of the topic to be discussed at the Tuesday shop course, all foundrymen interested in shell molding are invited. The subject is Dimensional Tolerances of Shell Cast Non-Ferrous Metals, and deals with the AFS sponsored research at the University of Michigan, Ann Arbor, Mich.

Sand

Much fundamental information of interest to all foundrymen will be offered at the Sand Shop Course sessions scheduled for 8 pm, Monday, and 8:30 pm Tuesday at the Rice Hotel. The 8:30 starting time for the Tuesday session is to allow those attending the Sand Division Dinner at 6 pm, enough time to make the session.

Subject for the Monday meeting will be Fitting Sand Control to Your Foundry and the panel will consist of T. C. Alford, Wheland Co., Chattanooga, Tenn.; Harry Wilson, Electron Corp., Littleton, Colo., and Fred W. Jacobs, Texas Foundries, Inc., Lufkin, Texas.

Sand Preparation Without Guess Work, will be the subject of the Tuesday meeting, immediately following the Sand Division Dinner. William E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind., and Jean Danenfelser, International Harvester Co., Indianapolis, will comprise the panel for the meeting.

Malleable

Because it was so successful last year, a Malleable Iron Shop Course will again be presented and should prove of interest to all malleable foundrymen, especially those connected with the smaller shops. The two sessions will be held at 4 pm, Monday and Tuesday, May 23 and 24, at the Rice Hotel.

Pearlitic Malleable is the subject of the Monday meeting. Discussion of various methods for producing pearlitic malleable iron will include: base iron used, heat treatment, controls required, finishing operation and properties obtained.

Two papers will be presented at the Tuesday session: *"Has Research on Hot Tears Prevented Their Occurrence?"* and *"Effects of the Melting Process on the Cracking Tendencies of Malleable Iron."*

HERBERT T. WALWORTH/*Director, Industrial Hygiene*
Lumbermen's Mutual Casualty Co., Chicago

Foundry Noise *and its* Control

Here's a review of some of the technical factors of industrial noise exposures and some practical approaches to noise control.

■ It has been estimated that between 15 and 20 million adults in this country have defective hearing. Exposure to excessive industrial noise is only one of the causes of defective hearing, and thus industry is faced with the prospect of assuming responsibility for impaired health which was not caused by conditions of employment. Some of the more important items needing further research and study at this time are:

1. The development of permissible safe noise levels.
2. Practical procedures for determining or evaluating hearing loss. While pure tone audiometers are in common use, the procedure for operation in actual use may be subject to criticism because test room background noise will usually exceed the decibels of hearing loss being tested.

Medical departments and audiometric testing rooms in areas with noise levels below 50 decibles (commonly recommended) do not seem practical for most industrial facilities.

3. Procedures for evaluating relative or percentage hearing loss.
4. Specifications for construction of acceptable rooms for audiometric testing.
5. Practical medical control programs for the noisy trades.
6. Evaluation of permanent hearing loss in relation to time of last exposure.
7. Measurement of impact noises.
8. Noise control. The scope of noise control is so broad that years may be required before significant accomplishments are made.

It is apparent that the scope of these problems suggests the need for early study and research.

Research in Industrial Noise. A complete summary of the various aspects of noise and its effects on behavior, the human ear, and communications was published by Kryter[1] in 1950. This report is a review, evaluation, and interpretation of the experimental literature on noise up to that time, and should be required reading for those more than casually interested in this subject.

In the middle 1940's, the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology became interested in industrial noise and its effect on workers, and promoted discussions among professional groups to stimulate greater interest in the subject. The Sub-committee on Noise in Industry of this committee instituted a research program designed to evaluate some of the factors concerned with loss of hearing and industrial noise. Other groups showed increased interest and many new research projects were instituted in various phases of the problem. However, it soon became apparent that the compensation aspects of industrial loss of hearing were developing more rapidly than the results of scientific research. This emphasized the need for expanding these research projects and broadening their scope.

In the spring of 1952, two widely separated industry groups approached the Industrial Hygiene Foundation with the proposal to undertake the job of promoting and coordinating industrial noise research. The Foundation was selected because of its long association with industry in connection with industrial hygiene and health problems. Also, it has facilities and a staff to form the nucleous around which a practical program can be developed.

The Foundation agreed to study this problem and the project is now under way. When sufficient funds are available, the Foundation will promote specific research among those organizations already working in this field. Much of its effort will be directed toward

Sound and Its Physical Properties

Sound. Sound is a series of alternate waves of compression and rarefaction, set up in a transmitting medium such as the atmosphere by a mechanically vibrating body. In the atmosphere, sound waves are radiated spherically. When these waves are received by the human ear, they are translated into sound through the hearing mechanism.

Cycle. One complete forward and backward movement of the vibrating sound source which produces one complete sound wave.

Frequency. The number of cycles per second of time, or the number of waves reaching the ear per second.

Hearing. Hearing is the mechanism by which sound waves are transmitted into sensations of sound. Pitch is the sensitivity of the ear to sound frequency. The ear can distinguish frequencies ranging from 20 to 15,000 cycles per second. Thunder, for example, is composed of low pitched sounds, while the chirp of insects represents high pitched sounds. Middle C on the piano is 256 cycles per second, and each octave above is twice the frequency preceding. The human ear is a sensitive and versatile mechanism, for it measures many of the physical properties of sound over wide ranges. In addition, it measures loudness of sound, a property which cannot be directly measured by scientific instruments.

Intensity—Decibels. The ear is capable of receiving a large range of sound intensities. The loudest sound the ear can hear without pain (120 decibels) is one trillion times the intensity of the faintest audible sound. Because of this wide range of intensities, the decibel has been adopted as a more convenient unit to use in calculations. The decibel is a unit for measuring the ratio of two amounts of acoustical power (sound intensity or pressure).

The decibel is a logarithmic unit and thus cannot be added or subtracted as we do length, weight, and time. If the intensity of any sound is doubled, there will be a corresponding increase of approximately 3 decibels. For example, two horns each of 60 db intensity or sound pressure will yield a combined intensity of 63 db and not 120 db as is sometimes believed.

Also, one decibel increase corresponds to an increase in intensity of approximately 26 per cent.

Loudness. Two sounds of the same intensity level, but of different frequencies do not necessarily sound equally loud. Neither does one sound having double the intensity of another sound appear twice as loud. The reasons for this are at least partially explained in Fig. 1, which shows the Fletcher-Munson curves of equal loudness. The curves were constructed on the basis of loudness judgments of large numbers of persons with normal hearing. Each point on one of these lines or contours represents a sound which appears to the average normal ear to be just as loud as the sound represented by every other point on the contour. For example, if a tone of 1000 cycles per second (cps) is set at 50 decibels intensity level, the loudness would be the same as a 100 cps tone of 67 decibels (follow 50 phon line to intersect 100 cycle frequency and read 67 decibels).

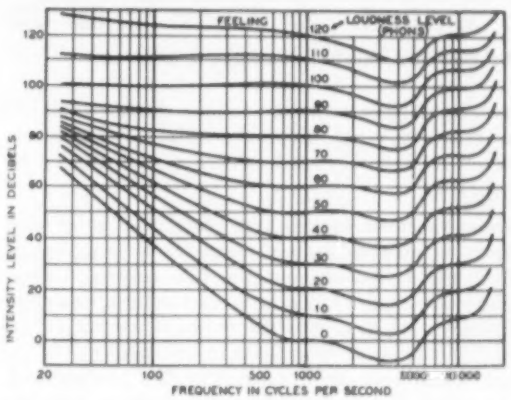


Fig. 1 . . Fletcher-Munson equal loudness curves.[6]

This chart leads to the following conclusions:

1. High frequency sounds at low intensity levels seem louder than low frequency sounds of the same intensity.
2. At high intensity levels, all tones sound almost equally loud at all frequencies.

Noise Measurement. Intensity levels of noise are measured in decibels by means of the sound level meter. When used with the octave band analyzer, it is possible to measure noise intensity levels in octave bands ranging from 20-75 cps to 4800-10,000 cps. When evaluating noise exposures, it is important to use the octave band analyzer since there are indications that noise exposures in the middle and high frequencies are more damaging to the hearing mechanism than those in the low frequencies. In addition, the collection of frequency data usually gives valuable information for noise control.

coordination of existing research, rather than to encourage the development of new facilities. As the program develops, it also will act as a clearing house for information on the broad field of industrial noise.

Noise Effects on Work and Efficiency. It is quite generally believed that noise causes fatigue and thus reduces production and efficiency. With further reference to Kryter's[1] work, ". . . field studies do not convincingly show that the noise encountered in certain industries and offices has any detrimental or beneficial effect upon non-auditory tasks performed by man."

It was Kryter's general conclusion that nearly all field and laboratory studies which reported that noise adversely affects work output were open to criticism because of poor study techniques and failure to control related variable factors, such as lighting, temperature and humidity. In fact, most of the well controlled studies revealed that steady noises do not adversely affect the ability of persons to do mental, and ordinary motor or mechanical tasks.

Most of the research studies on the effect of noise on work output and efficiency did not consider noise effect on communication. It can be assumed that noise can

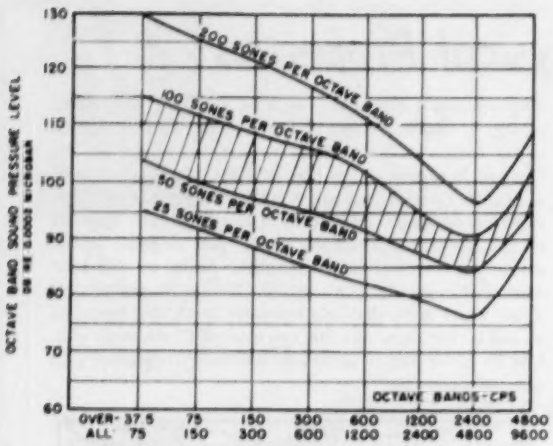


Fig. 2 . . Hardy's tentative hearing risk criterion.[5]

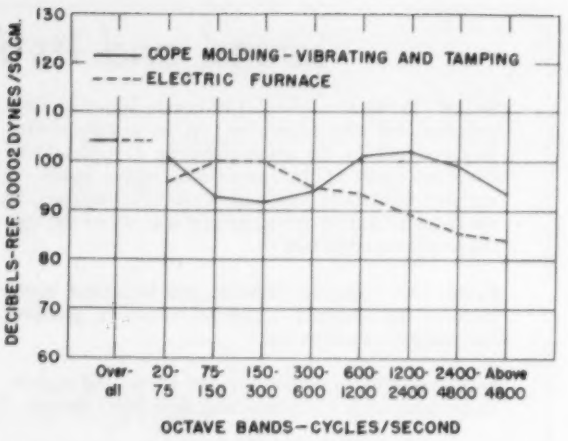


Fig. 3 . . Noise spectra for two foundry operations.

interrupt, interfere with, or reduce the accuracy of communication. Where communication is not a factor, the effects of noise on work efficiency are believed to be negligible.

Permissible Noise Levels. The greatest value of well founded permissible or safe noise levels is as bench marks in the design of environmental control. Unless permissible levels are based on scientific facts, however, an injustice may result to the exposed worker or an unusual burden will be placed upon industry.

Many workers in the industrial health, medical and other fields have suggested permissible levels ranging from 75 to 115 decibels.[4] In practically all of these cases, the suggested levels are in over-all intensity in decibels without consideration of frequency.

A few workers have proposed tolerance levels in which frequency is considered. However, except for the lowest octave band, there is poor agreement throughout the remainder of the frequency spectrum. More recently, Hardy[5] suggested permissible levels (Fig. 2).

According to Hardy the 50-sone and 100-sone curves suggest the lower and upper limits respectively of damage risk for prolonged daily exposures. In other words, it is suggested that noise levels in frequency bands above the 100-sone line are definitely damaging to the hearing of exposed workers, while noises falling below the 50-sone line are considered safe. The area between these two curves includes all border-line noises which may or may not eventually be shown to cause hearing loss.

Foundry Noise. The evaluation of foundry noises presents many problems because of the great variety of operations and the influence one operation has on noise exposure at another. Open windows tend to decrease noise exposures (by reducing reflections), and the construction of walls or the installations of metal shields may increase exposure by increasing reflections. Plant layout and arrangement of equipment also affects the noise level. So does an increase or decrease in the number of operating machines.

Because of the many variables in noise exposure, it is possible that noise levels inside a foundry may change one, two, or more decibels in any octave band from day to day. Variations of over 10 db can be expected when the same operation is being performed on different pieces of work. Likewise, the noise exposures for similar operations may vary from one foundry to another. The noise produced by a machine depends on its size, weight, speed, mounting, location with respect to other machines and reflecting surfaces, and state of repair. Thus, while the noise spectra reported in Fig. 3, 4, and 5 are typical of the foundry operations reported, they may not be the same for all foundries.

The measurements reported here were made using the standard sound level meter in conjunction with an octave band analyzer. The importance of measuring noise in octave bands cannot be over-emphasized since it not only shows the contribution of different frequencies to the total noise, but it also gives information as to where to start when considering control.

Figure 3 shows the noise spectra for a molding operation and an electric furnace. It is interesting to note that the over-all level was 104 db in each case, but the distribution of noise by octave bands varied considerably. The greater part of the energy of the electric furnace noise was in the lower frequencies, while the energy of this particular molding operation was in the higher frequencies.

Figure 4 presents three noise spectra of shakeout operation. The solid line shows the noise picture of a vibrating grill type shakeout handling large castings. This curve has a general upward trend, with the highest noise levels in the four upper octave bands. The dotted curve represents the noise from the vibrating grill alone. The two curves are somewhat similar in shape but the noise levels are lower with the vibrating grill alone.

The spectrum for rod shakeout was similar to large casting shakeout, but noise levels were slightly lower. The higher noise level in the 600-1200 octave band for the large castings shakeout may have been caused by the shape of the castings which produced and amplified the noise in this frequency band.

Figure 5 shows noise from chipping and grinding operations. Most chipping operations will result in considerably higher noise levels in all octave bands than those shown. In this case, chipping was being done on small castings with a small tool. Grinding noise also may be higher in many situations since in-

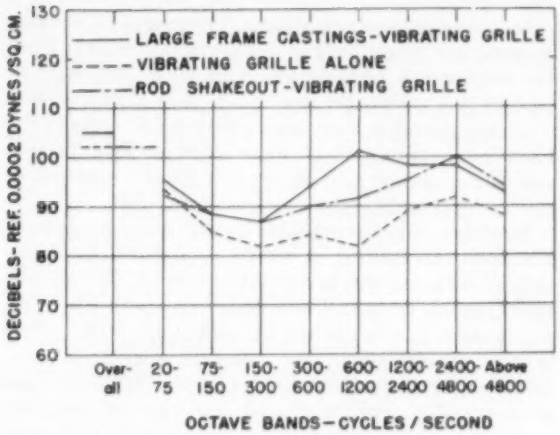


Fig. 4 . . Foundry shakeout noise spectra.

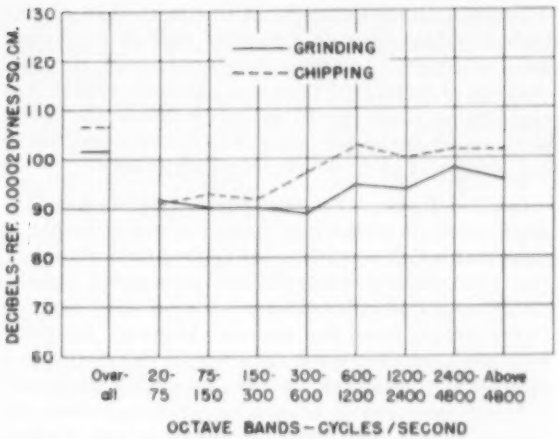


Fig. 5 . . Noise spectra for grinding and chipping.

tensities will be influenced by the number of machines, type of metal and castings, and the size and shape of casting. The general trend of these curves is upward in the higher frequencies.

In general, these spectra illustrate the concentration of noise in the higher frequencies, an area which is potentially damaging to the ears of exposed workers. They further illustrate some of the complicated control problems facing the foundry since shakeout and chipping operations in particular do not lend themselves to the simpler control methods. In any case, the first step in noise control is evaluation of the potential hazard, followed by a program of re-evaluation as exposures are controlled or improvements made.

Noise control for worker protection has not been generally practiced in most modern industries. Many of the advances in this field have been made in quieting offices, hospitals, and schools for the purpose of improved comfort. However, since useful knowledge in scientific fields grows with practical experience, an understanding of the basic principles of industrial noise control and their application should form the basis for rapid progress in this field. These basic principles are:

Quiet the Source. Just as industrial dust, fumes, vapors, and gases are best controlled at the point of origin, so are the greatest benefits derived from noise control at the source. This can be accomplished through emphasis on noise control in machine design, redesign after installation, or machine maintenance. The ideal approach, of course, is noise reduction through improvements in design.

Many manufacturers have done outstanding jobs in this respect, although much of the noise reduction has been accomplished in connection with items sold to the public, such as automobiles, refrigerators, home appliances, etc. As time goes on, industrial purchasers will demand quieter machines, and designers and suppliers will be required to give more consideration to these factors.

As the foundry industry recognizes and evaluates its noise problems, it will be in a better position to make changes in operating machines that will be favorable to noise reduction. Gear noises, loose bearings, noisy conveyors, escaping compressed air and steam, and similar noise sources can be quieted through engineering and maintenance department changes. The noise caused by escaping waste compressed air is easily controlled by use of a simple muffling device packed with brass or other metal turnings (Fig. 6).

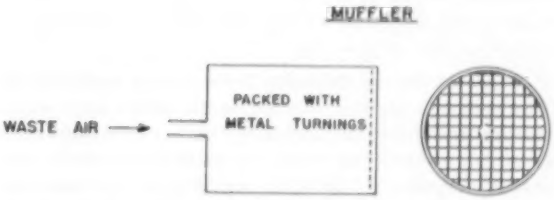


Fig. 6 . . Muffler to control noise of escaping air.

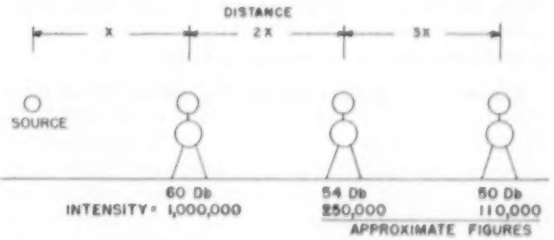


Fig. 7 . . Sound intensity is reduced appreciably by increasing the distance between worker and noise source.

Other considerations to bear in mind when controlling noise at its source are:

1. Determine the vibrating surfaces
2. Reduce area and number of vibrating surfaces
3. Avoid vibrating or impact forces
4. Avoid high frequency vibrations
   a. Control by increasing weight
   b. Decreasing speed
5. Use rubber or other dampening materials wherever possible.
6. Provide regular maintenance

Substitute Less Noisy Operations or Machines. Certain operations may lend themselves to a form of substitution which will provide for the elimination of

noisy operations. Examples of this method of control include substitution of "squeeze" type of equipment and welding for riveting operations, and chemical cleaning of metal for high speed polishing wheels. The engineering departments of many industries should be in an advantageous position to consider such methods of control in its development activities.

Increase Distance Between Source and Worker. The application of distance to noise control is simple in theory, although it may not always be practical in practice. For example, the necessity for operating a shakeout machine at a particular location may make it impractical to move that machine. However, much can be accomplished in noise reduction if this principle is applied in plant layout, or when relocating machinery.

Noise reduction by increasing distance follows the inverse square law. Thus, be doubling the distance from the source, the sound intensity is reduced to one fourth of the original intensity. Tripling the distance reduces the intensity to one ninth. It may be possible, therefore, to effectively reduce noise exposure by minor adjustment in plant layout. The effect of distance is roughly illustrated in Fig. 7.

Construct Barrier Between Noise Source and Worker. The isolation of noise sources should have many applications in the foundry industry. This involves the construction of a wall or other barrier between the source and the exposed workers, or isolating the operation in a separate room. If the isolated machine requires an operator, protection may be provided by the installation of sound absorbing material or by supplying workers with adequate personal protective equipment. Thus, the efficient use of barriers, or isolation of especially noisy operations, can greatly reduce the number of workers exposed to damaging noise.

Reduce Noise Reflections by Absorption. When noise is emitted from a sound source, sound waves travel outward in all directions. When the sound wave encounters other machinery or walls, it is reflected in the same manner as light. As other surfaces are encountered, the wave is again reflected. Thus, every part of the room almost immediately is filled with sound waves traveling in every possible direction.

These multiple sound reflections have the effect of increasing the over-all sound intensity. The total sound intensity will equal the sum of the intensities of the direct and indirect sound. In any foundry or other industrial operation, reflected sound can contribute materially to the noise exposure. In some cases, reflected sound can cause an increase of as much as 25 db over the intensity level of the direct noise alone. The control of noise by the absorption is illustrated in Fig. 8.

As mentioned above, noises in the higher frequencies are more damaging to the human ear. Fortunately, it is the noises of higher frequency which are more easily controlled.

Reduce Exposure Time. In atomic energy installations, exposure to external radiations is limited to 300 milliroentgens per week. Various methods are used to measure total exposure to radiation, and when the exposure exceeds 300 milliroentgens in any one week, the worker is removed from all radiation exposure and he is not permitted to work until the average weekly exposure is reduced to below the permissible levels.

In a similar manner, the total exposure of workers to noise can be reduced by removing the worker from the exposure a certain period of time each day, or transferring the worker to a "quiet" area after spending a certain period of time in excessive noise. Usually the human ear can resist high noise levels for short periods and the provision of rest periods offers a method of averaging the high with low exposure levels.

However, since permissible or safe noise levels have not been determined, it would be difficult to immediately measure the beneficial effects of 2-hr or 4-hr relief periods from excessive daily exposures. Thus, the application of this method of worker protection offers certain problems and the complete answers will be forthcoming only after further study. However, the practice of a well organized audiometric program makes it possible to regulate exposure time with sufficient accuracy to insure worker protection.

Admittedly, this method of control offers many administrative problems, but unless industry can reduce harmful noise levels by engineering or other means, such measures may be necessary.

Provide Personal Protection. The use of respirators for protection against dusts, fumes, vapors and gases usually is considered only when conditions are temporary, or when ventilation or other engineering control is not practical. The application of this basic principle to the wearing of ear protectors, ear muffs, or helmets for reducing noise exposures would be considered desirable.

There are certain operations and machines in the foundry industry which do not lend themselves to the application of engineering quieting procedures. For example, there is little prospect that grinding and chipping operations can be quieted at the source, and methods have not yet been developed which would allow the substitution of a quiet process. While it is possible that these operations might be isolated and the reflected sound absorbed by acoustical materials, the operator would still be exposed to high noise levels. Thus, the only known protection for the operation is suitable ear protection.

Ear protectors are of three types:[2] substances inserted into the canal (insert types); objects covering the orifice of the canal (muff types); and fitted coverings (helmets) which include the major area of the skull. The protection (reduction in decibels of sound reaching the inner ear) afforded by the various devices on the market will vary considerably. Perhaps 25 or more decibels attenuation in all frequencies might be expected if the protectors are properly fitted. There have been no reliable scientific reports concerning the protection provided by various ear defenders.

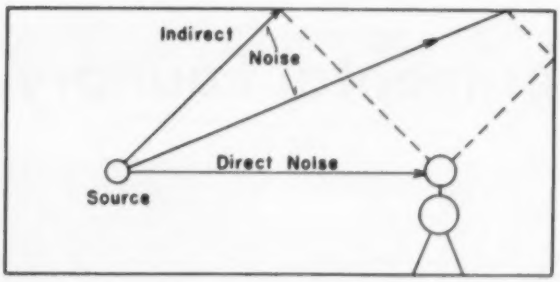
The success of an ear protector program will hinge directly on program planning, the backing of management, and the effort made to "sell" and supervise the employees participating. Unlike respirators, insert ear protectors cannot be seen readily from a distance and close supervision will be necessary.

In high noise exposures, many employees plug their ears with dry cotton for protection. This practice has been proven to be of no value in excluding noise, but the supervisor may encounter difficulty in convincing

the employee that he should wear an "acceptable" protector which may be uncomfortable to wear.

Following are hints which may be helpful in instituting an ear protector program:

1. A reasonable supply of ear protectors should be kept on hand, as they are small and easily misplaced.
2. Ear protectors should be cleaned daily.
3. A suitable lubricating jelly should be readily available where permanent type protectors are used.
4. Workers should be encouraged to replace defective protectors promptly.
5. Workers should be instructed to select the largest size which will fit into the ear canal. Employees have a tendency to select the smaller sizes of protectors because they are more comfortable.
6. When purchasing ear protectors in quantity, it has been suggested that the total order include sizes in the following proportions:[2] small, 15 per cent; medium, 70 per cent; large, 15 per cent.



NOISE CONTROL BY ABSORPTION

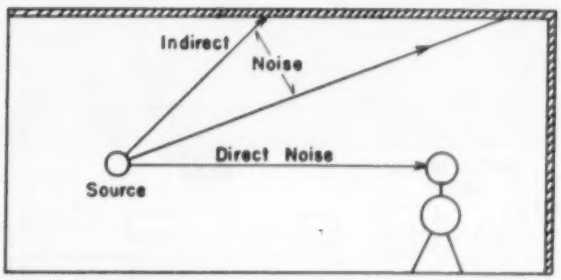


Fig. 8 . . Over-all sound intensity may be reduced by adding absorbing materials to stop noise reflection.

In the minds of many people, the complete answer to noise control is the use of acoustical materials. While these products have many valuable applications, they are not the answer to all noise problems. Occasionally, acoustical materials are sold with the promise that the noise in a given situation will be reduced by a high percentage. Usually, such claims refer to a reduction of energy or loudness by these percentages, although the customer may believe that the anticipated reduction is in decibels. The table gives a comparison of noise reduction in decibels and the corresponding percentage reduction of energy and loudness.

Note that, a one decibel reduction will result in 20 per cent decrease in energy and a 5 per cent decrease in loudness. Likewise, a reduction of 3 decibels corresponds to 50 per cent decrease in energy and a 20 per cent decrease in loudness.

Medical Control. It is not the purpose of this paper to outline a medical control program for noisy occupations. However, many of the phases of suggested medical control programs for the noisy trades need clarification. The establishment of audiometric programs should be made with the full realization of the possible pitfalls and the probable results which may be realized. Among other things, the application and use of speech versus pure tone audiometry should be clarified.

Further information regarding medical control in the noisy trades may be secured by contacting the Subcommittee on Noise in Industry of the Committee on Conservation of Hearing of the Academy of Ophthalmology and Otolaryngology.

Conclusions. Industrial noise exposures are by-products of the growth and mechanization of industry.

The prospect that industrial loss of hearing may become a compensation problem emphasizes the need for increased activity in the field of noise control. Scientific advancements in this field have been slow and there is need of much additional medical and engineering information. However, present knowledge, if used and properly applied, will go a long way toward the protection of workers exposed to excessive noise. Industrial noises can be measured with equipment now available and by techniques which have proved satisfactory. While permissible noise exposure levels have not been definitely established, sufficient data are available which at least classify noisy operations into "excessive," "border-line" and "safe" categories.

After having classified its noise hazards, the foundry industry can establish control programs based upon the discussion presented above. For the noise hazard which cannot be controlled by use of the plant's existing facilities, there are consulting organizations which may be employed to give these problems detailed consideration. For situations which still do not lend themselves to engineering control, individual worker ear protection is still available. Of course, any such program should include medical control using approved audiometric procedures and techniques.

In the final analysis, the success of industrial noise control programs will depend upon industry's desire to study and control its own hazards.

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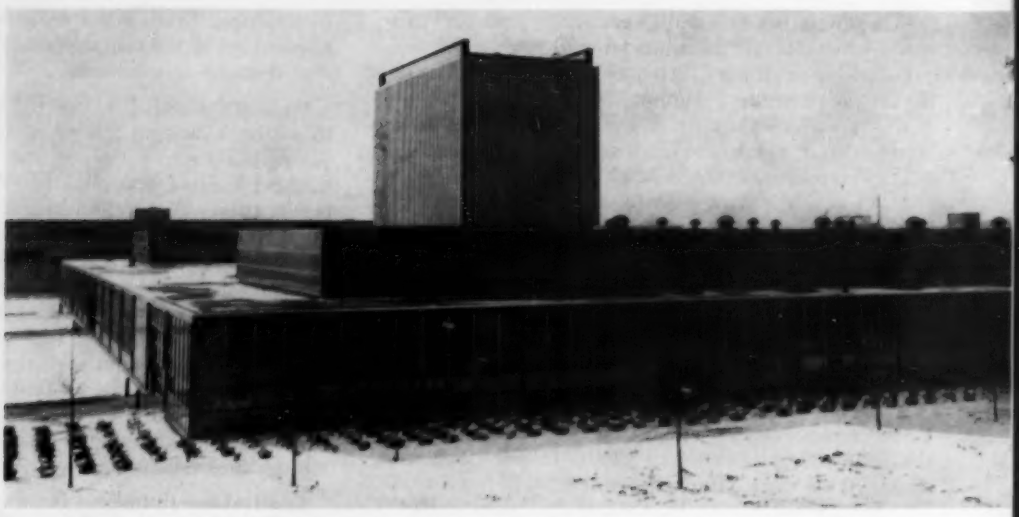
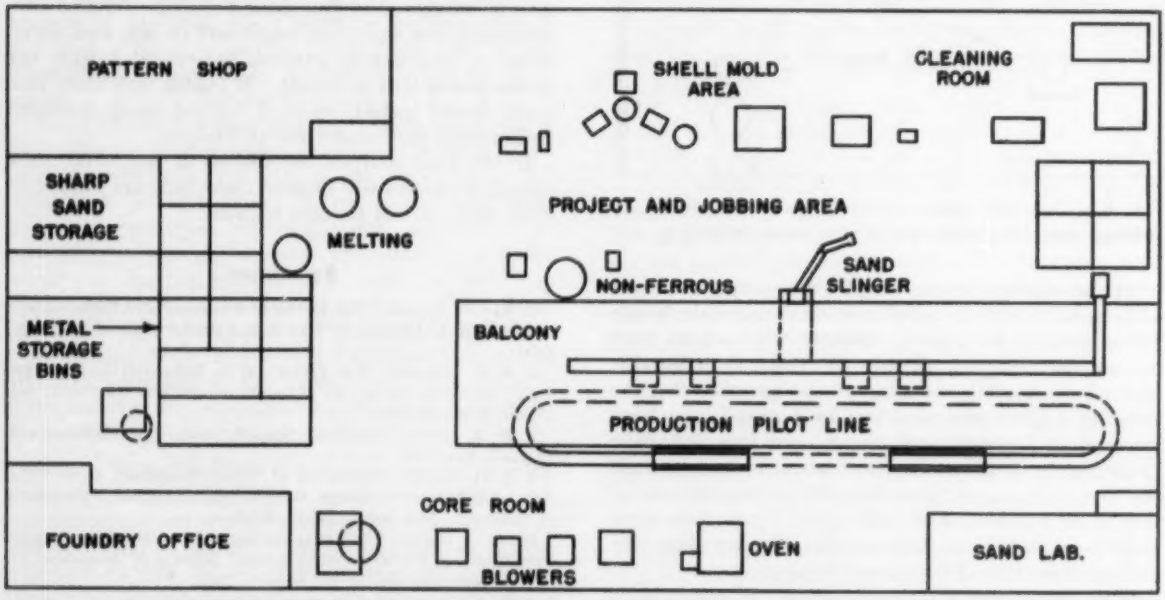


General Motors' Experimental Foundry

LOUIS J. PEDICINI / *Supv., Experimental Foundry*
Process Development Section
General Motors Corp., Detroit

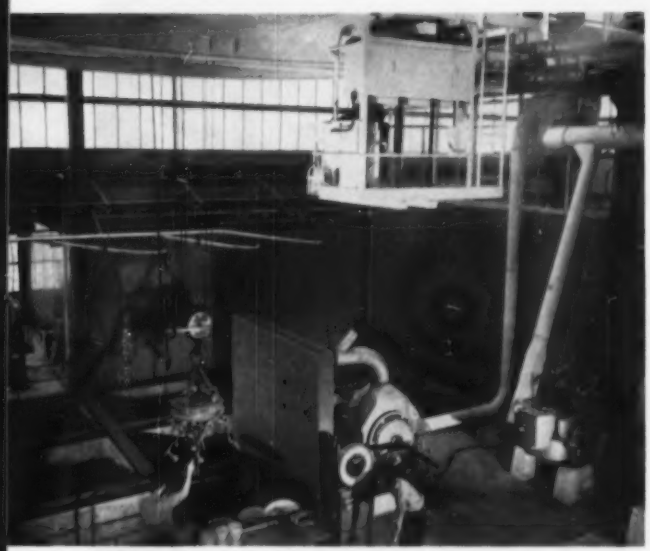


Layout of new experimental foundry of General Motors Corp.

Fig. 1 (left) . . Exterior of experimental foundry. Tower will house cupola, air pollution control equipment and laboratory.

Fig. 2 (right) . . Main bay of foundry. Dust collection equipment is on balcony at right.

Fig. 3 (below) . . Metal storage bins are served by bridge crane and electromagnet.



■ Improvement in foundry techniques had progressed at a relatively slow rate until the start of World War II when the demand for high quality castings encouraged many of the larger foundry companies to set up research and development facilities which have contributed tremendously over the last 15 years. Today extensive experimental foundry facilities are supported by most of the large producers of castings. General Motors Corp., being both the largest producer and the largest consumer of ferrous castings in the world, realized the need for experimental foundry facilities to maintain their competitive position in the automotive industry. Such a facility is now in operation as part of the General Motors Technical Center near Detroit.

This experimental foundry is part of the Process Development Section shop and foundry building. An area 120 ft x 240 ft of the building is devoted to the experimental foundry. The facilities in this area were planned to permit the casting on a simulated production basis of any ferrous casting in size up to the eight cylinder engine block. Facilities have also been provided to permit the casting on a jobbing shop basis of parts such as machine bases up to two tons in size. Aluminum castings up to 300 lb in weight can be handled readily and copper-base alloy castings up to 500 lb are also produced.

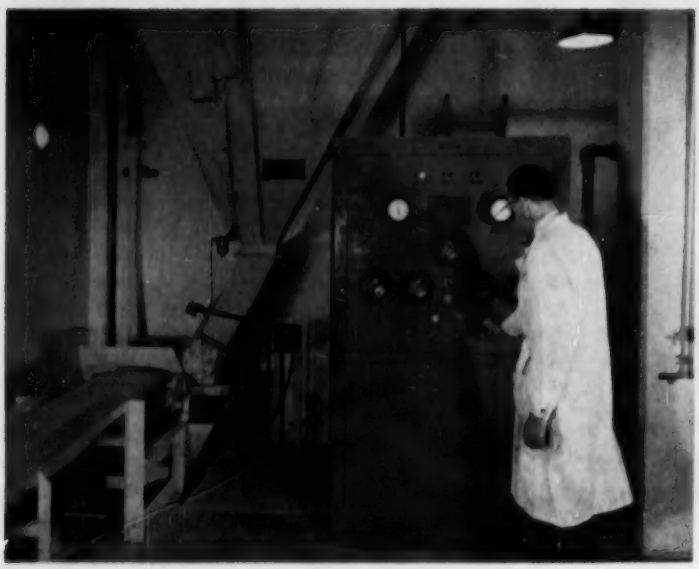
It was felt that an experimental foundry to be of maximum use to all the General Motors divisions would have to have a pilot production operation as well as a flexible array of jobbing shop facilities. It was hoped that the experimental foundry would have equipment of sufficient capacity to handle any casting made in General Motors on a production basis.

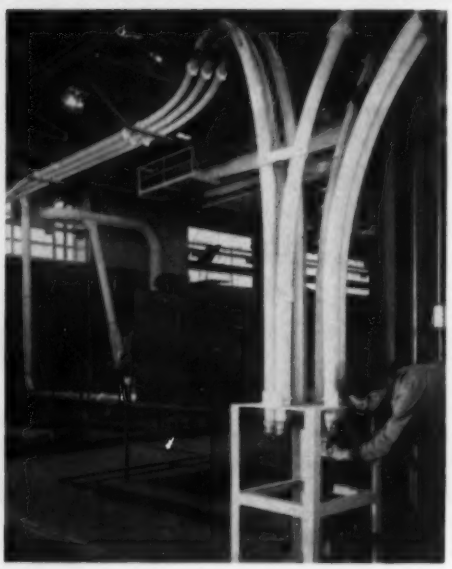
Approximately 19,000 sq ft of first floor space is under a monitor bay having 32-ft clear head room. The bay around the perimeter of the building proper has a head room of 19 ft. This is shown in Fig. 1. A 69-ft penthouse will provided for future installation of a cupola (Fig. 1). It has two floors, the charging floor at an elevation of 33 ft, and a dust collection laboratory at an elevation of 48 ft. The cupola is planned for the near future.

The balcony, shown on the right in Fig. 2, supports the dust collection equipment. Three different models of wet type collectors have been installed to handle both the dust collection and the ventilation. As an extra precaution against spreading dust-laden air over the Technical Center site, all of the ventilation air from the mold conveyor tunnel and hoods that is normally exhausted to atmosphere is put through wet dust collectors. A total of 138,000 cfm of air is exhausted from the foundry. Approximately 38,000 cfm of air is supplied from the outside as compensating air at the pouring hood, drag shakeout, and in the mold conveyor tunnel. One hundred thousand cfm of filtered and heated air is supplied to the foundry along the south wall.

Two bag-type dust collectors have been installed on the laboratory floor of the penthouse to handle the air from the electric furnace hoods shown in the right foreground of Fig. 3.

The foundry consists of the following areas: (1) Material storage area; (2) Melting area; (3) Core room; (4) Production molding line; (5) Cleaning room;





(6) Shell mold area; (7) General project area and jobbing floor; (8) Laboratories; and (9) Pattern shop.

Storage Area. Sufficient storage space has been provided to permit the foundry to operate at full melt capacity (with cupola) for a 30-day period. In the foreground of Fig. 3, are nine concrete pits providing storage for the melt materials. Each pit is 9 ft square by 12 ft deep. A 5-ton, cab-operated crane with precision control spans this area. It is equipped with a motor-generator set for operating an electromagnet.

Two steel sand bins, one with a capacity of 500 tons and the other of 300 tons, are shown in the background of Fig. 3. A pneumatic sand handling system transports sand from a below-the-floor truck hopper to these bins. As it is needed, sand is conveyed on belts from the bins to the pneumatic pressure vessel and blown to any one of the five points of usage (Fig. 4, 5, and 6).

Truckload quantities of special sands can be dumped into the truck hopper and blown to a receiving hopper on the balcony for gravity feed into pallet boxes. Selection of transport pipeline is made by manually connecting it to the rubber discharge pipe to the activator. A fire hose coupling is used to accomplish this easily (Fig. 7).

Approximately 10,000 sq ft of space is available in the basement for storage. Easy access is afforded by a freight elevator located just outside the foundry area.

Melting Area. Three electric furnaces handle the ferrous melting requirements at present: one, a 500-lb per hour indirect arc type; one, a 500-lb per hour direct arc type; and the third, a 250-lb per hour direct arc type. For a simulated production job it is possible to accumulate 1800 lb of molten iron.

Furnaces are charged by hand, every ingredient being carefully weighed on a scale of capacity proportional to the weight of material. Metal is tapped into a shank ladle for small jobs or (Fig. 8) a transfer ladle on a lift truck for large jobs. Control tests and metal analysis are

Fig. 4 (upper far left) . . Pressure vessel for pneumatic sand transporter.

Fig 5 (upper near left) . . Belt conveyor handles raw sand from storage to mixer.

Fig. 6 (lower far left) . . Truck hopper is first stage in raw sand handling.

Fig. 7 (lower near left) . . Fire-hose coupling substitutes for complex switch in pneumatic sand transporting system.

Fig. 8 (above) . . Ladle is suspended from fork of lift truck for convenient handling.

Fig. 9 (upper right) . . Aluminum is melted in 400-lb gas-fired crucible furnace.

Fig. 10 (right) . . Core room has wide variety of core making facilities.

run on every heat; results are made part of a permanent melt record.

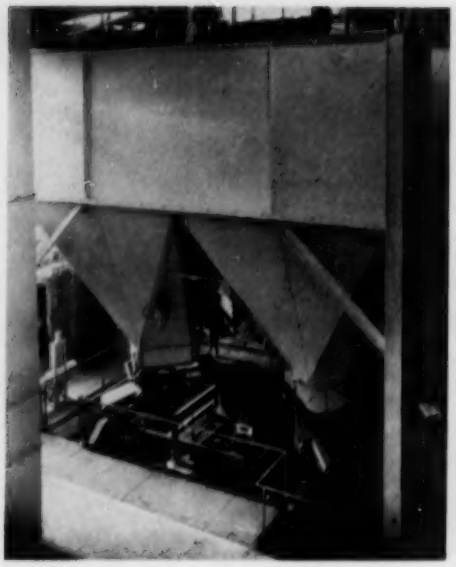
For melting aluminum a 400-lb crucible-type gas furnace is available. This is equipped with recording-type immersion pyrometer and nitrogen fluxing equipment. A motorized screen and a small jolt-squeeze machine are of the non-ferrous floor (Fig. 9).

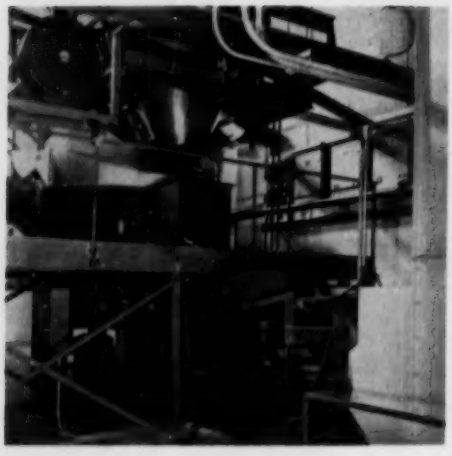
Core Room. Figure 10 shows the facilities of the core room. In the foreground is the sand mixing unit which consists of a two-compartment bin (fed by the pneumatic transport system), a weigh hopper, and a muller-type mixer. All controls are mounted on a panel at the rear of the platform; three electric timers are provided for accurately controlling each phase of the mulling cycle.

Sand is distributed to the blower hoppers in a drop bottom bucket on a monorail hoist. These hoppers were specially designed to accommodate the sand bucket. Four core blowers of three different makes have been installed, so that the entire range of automotive cores can be produced. Three different types of rollover-draw equipment are also available to permit duplication of production cycles of any of the General Motors foundries.

Core baking is done in the batch-type, gas-fired core oven shown in the background on Fig. 10. Space beyond the oven is available for cleaning, assembling, and dipping cores.

Production Molding Line. A complete production mold conveyor line makes it possible to process a casting for production ahead of a new model deadline while remote from the production of the current model. Full attention can be given to the details of gating and risering, yield, scrap, methods engineering, etc. The heart of this line is the mechanized sand system, part of which is shown in Fig. 11. The molding sand bin is divided into four 45-ton sections, any one of which can feed sand to the weigh hopper over the muller-





type batch mixer. The divided bin provides storage for sand from any four General Motors foundries at the same time. Castings can be made for one foundry today, and while being inspected and changes drafted, the sand can be returned to its hopper and a different pattern run for another foundry with their sand.

Sand System Highly Mechanized

After the proper sand has been fed into the mixer, the correct quantities of various binders are taken from their storage hoppers (Fig. 12) and added. An electric timer signifies completion of the mixing cycle, then sand is dumped onto the mill belt (Fig. 13) and carried to a bucket elevator which raises it to the sand distribution belt on the balcony over the molding machines. Sand is plowed off into molding machine hoppers by automatic air-operated plows (Fig. 14). Excess and spill sand is guided onto the sand return belt in the basement by chute plates, and carried back to the storage bins via bucket elevator.

Figure 15 shows the mold conveyor with its pouring and cooling hoods. The conveyor which consists of 53 cars, 34 in. wide by 58 in. long on five-ft. centers, travels nine to 36 ft per min in a loop past the molding machines. Figure 16 shows how the mold conveyor travels down an incline of 15 degrees into the basement during the cooling period, and comes up again at the shakeout area. This provides an opening in the conveyor loop on the main floor to permit the setting of cores in the molds from the inside of the loop. In this way considerable floor space is saved.

The jolt-squeeze-strip machine shown at the left in Fig. 15 is one of the pair of medium size machines installed at this writing. It has a 24-in. diameter squeeze cylinder and a 10-in. diameter jolt cylinder and can handle patterns up to 22 x 44-in. These machines are commonly used in G.M. production foundries for making cylinder head molds.

Three 2-ton, direct-current, bridge cranes are installed over the mold conveyor for setting molds and cores (Fig. 15).

Two vibrating shakeout machines with ventilation hoods are shown in Fig. 17. Two 2-ton, direct current, cranes are used to handle flasks and castings from the mold conveyor on the shakeout, and flasks back on the mold conveyor for return to the molding ma-

Fig. 11 (upper far left) . . Molding sand bin has four 45-ton compartments.

Fig. 12 (upper near left) . . Small scale weighs binders directly from storage.

Fig. 13 (lower far left) . . Mill belt feeds molding sand into bucket elevator.

Fig. 14 (lower near left) . . Sand is plowed off belt into molding machine hoppers by automatic air-operated plows.

Fig. 15 (right) . . Molding loop is complete with pouring and cooling hoods.

Fig. 16 (below) . . Poured molds are below main floor for most of cooling period.

Fig. 17 (lower right) . . Two hooded, vibrating shakeouts provide for drag (foreground) and cope (background) separately.

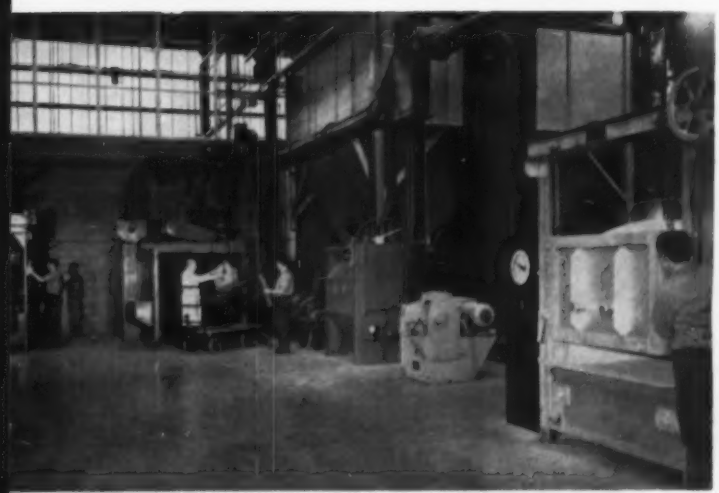


Fig. 18 . . Tumbling and table shot blasts, sand blast, tumbling barrell, and annealing oven are served by 5-ton crane.

Fig. 19 . . Multiple-station, dump-type machine makes shell molds as large as 24 x 41-in.

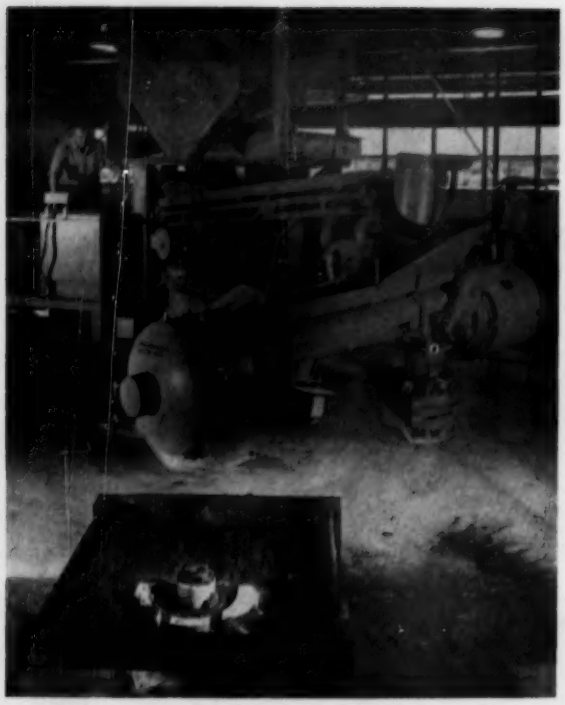


Fig. 20 . . Large molds are made on jobbing floor of general project area by remote controlled slinger.

chines. The cope removal section of the mold conveyor hood is shown in the background of Fig. 17.

Cleaning Room. The variety of casting cleaning equipment shown in Fig. 18, includes a 27 x 36-in. tumbling-type airless shot blast machine, a 66-in. table-type shot blast machine, a 20 x 48-in. tumbling barrel, a sand blast cabinet, and a 24 x 3 x 12-in. single wheel snagging grinder. Pneumatic chippers and grinders of various sizes are also available. All of this equipment is serviced by a 5-ton bridge crane. The furnace in the right foreground of Fig. 18 is used for annealing.

Shell Molding Area. With the growing interest in the shell molding process, no experimental foundry would be complete without facilities for study of this technique. Therefore, some of the latest equipment available has been installed to handle shell molds of even the largest castings, on a production basis. Figure 19 shows a multiple-station, dump-type machine capable of handling molds as large as 24 x 41-in. In the background is shown hand operated equipment for initial experimentation.

General Project Area and Jobbing Floor. The center bay under the 32-ft. monitor shown in Fig. 2 constitutes a general project area, where work is done on special investigations. At this writing, preparations were being made to install centrifugal casting equipment and a pilot sand reclamation unit for experimental work. In the left foreground of Fig. 2 is a shell-mold blowing machine being evaluated for possible production applications.

A precision controlled, 5-ton crane spans the entire length of this area. This crane is used for drawing patterns and setting cores in the jobbing section of this

Fig. 21 . . Pattern shop makes wood, metal, and plastic patterns; blow-plates; and simple fixtures. Facilities are a'so available for working with plater.

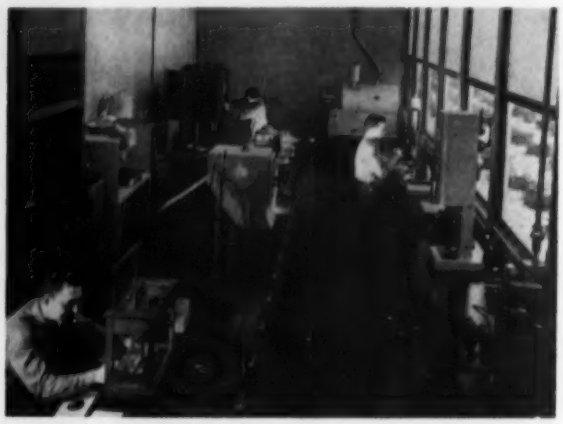


Fig. 22 . . Sand lab is equipped to provide a complete series of sand tests for each experiment. The sand lab has made material evaluations and scrap investigations.

Fig. 23 . . Completely equipped metallographic lab.

Fig. 24 . . Spectrographic lab provides rapid analysis for control of foundry research projects.

Fig. 25 . . Chemical lab, like met lab and spectro lab, is in the metallurgical department.

area. Figure 20 shows the remote controlled slinger in action.

Pattern Shop. A wood pattern shop is included as part of the foundry to expedite the initial phases of an investigation. In many cases when a wood pattern is not satisfactory, metal equipment is precision cast from it. Figure 21 is a general view of the pattern shop. An area has been set aside here for work on plastic patterns, and some metal working equipment has been installed for making blow-plates and other simple fixtures. All machines are serviced by dust collection equipment.

Laboratories. The sand laboratory (Fig. 22) plays an important part in all of the experimental work done in the foundry. A complete series of tests is run on all of the sand used and the results become part of a permanent record of the experiment. Many material evaluations have been handled exclusively in this laboratory, as well as several scrap investigations.

Although the sand laboratory is the only laboratory facility that is a part of the foundry proper, a metallographic lab, a spectrographic lab, and a chemical lab are included in the metallurgical department which adjoins the foundry (Fig. 23, 24, and 25). These facilities are available to the experimental foundry as well as to all General Motors divisions.

It is hoped that the General Motors Experimental Foundry together with similar facilities across the country will soon make their effect felt on the industry. The primary objectives of these foundries must be to improve quality and lower cost. However, much work will also be done toward making the foundry a better place to work.

Written discussion of this paper, Convention Preprint No. 55-110, should be sent to American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. This paper is one of 15 to be presented at the Sand sessions of the AFS Convention in Houston, May 23-27, 1955.

Will Show Carbon Dioxide Film at Sand Dinner

The Sand Division's Dinner, scheduled for 6 pm in the ballroom of the Hotel Rice, Tuesday, May 24, is not only a bold departure and an interesting development in the Sand Division activities but promises to be one of the highlights of the Convention.

There will be a discussion on the relatively new method now being widely tested for practical application, the Carbon Dioxide Process for Hardening Cores and molds. The paper will be presented by one of the development's foremost proponents, Dr. Waldemar Schumacher, Concordiahütte A. G., Bendorf am Rhein, Germany. In addition, a motion picture of the process just recently completed, will also be offered for the first time in the U. S.

E. C. Zirzow, Werner G. Smith Co., Cleveland, will preside at the meeting and Roy Carver, Carver Pump Co., Muscatine, Iowa, will act as co-chairman.

Immediately following the dinner at 8:30 pm, the Sand Shop Course will be held in the same room. The subject will be Sand Preparation Without Guess Work and moderator will be F. S. Brewster, Southgate Aluminum & Magnesium Co., Southgate, Cal. Panel members are William E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind., and Jean Danenfelser, International Harvester Co., Indianapolis.

In addition to the dinner and shop course scheduled for the Sand Division, seven other technical sessions and another shop course have been arranged. All meetings are being held at the Rice Hotel and subjects covered include: *"The General Motors Experimental Foundry," "What Are Your Raw Material Costs?" "Fitting Sand Control to Your Foundry," "New Foundry Sand Core Binder," "Sand Preparation Without Guess Work," "Current Status of Test Patterns for the Evaluation of Sand Mixtures." "Fundamental Principles of Agglomerating Process," "Use of Engineering Methods in Practical Sand Problems: Strength-Density Relationship,"* and many other subjects of current interest.

Fig. 1 . . Every part in these shovels is considered in the light of the question: Is there a less expensive, satisfactory way to make it?

What Design Engineers Look for in Castings

TREVOR DAVIDSON / *Chief Engineer*
Bucyrus-Erie Co.
South Milwaukee, Wis.

■ Perhaps every designer has had at one time or another the subconscious feeling that casting suppliers are completely reactionary, wholly without imagination, and insistent upon making things as simple as possible for themselves. On second thought, maybe foundrymen have a subconscious feeling that designers are slightly light-headed visionaries, completely careless of foundry problems, and too stubborn to accept constructive suggestions.

Unfortunately neither the designing nor making of castings derives from an exact science. Both are arts, and so both are dependent largely on personal opinion and experience. A designer may feel that a particular form of casting is essential for best performance of his machine; a foundry may feel that, in that particular form, scrap losses will be prohibitively high. Neither can offer absolute proof to back up his stand, and as each has at times proved the other wrong, each tends to question the other's expressed opinions.

In presenting the designer's views, it should be pointed out that the writer's foundry contact has been almost wholly with steel castings, weighing from a few pounds to 15 tons, with production quantities ranging from one or two per year to 20,000, but largely in the lower quantities.

Fundamentally, a designer is looking for just one thing: the least expensive way to make a part which adequately meets service requirements. Figure 1 shows a 3/8-yd shovel weighing 9½ tons and a 36-yd shovel weighing 1500 tons. Each is made up of several thousand parts. Every one of these parts must be measured against the same question: Is there a less expensive, satisfactory way to make it?

The foundry's salesman and the manufacturer's purchasing agent are likely to think of the least expensive part as the one having the lowest price delivered to the machine shop door. The manufacturer's salesman and the user's purchasing agent may think of the least expensive part as the one having the lowest price delivered at the working site, after adding machining, inspection, assembly, overhead, profit, and transportation to the price of the rough casting. The user's operating personnel will think of the least expensive part as the one which gives him the maximum return on his investment. He must add to the delivered price, the cost of transportation if the machine is moved frequently, the reduction in pay load if a part is heavier than necessary, the cost of a repair part and the labor to install it if there is rapid wear or premature failure, and sometimes the shutdown cost of an elaborate plant while a key machine is out of service.

When a casting, priced perhaps at less than $500,

Fig. 2 . . Failure of one part may shut down a multi-million dollar coal-mining operation.

fails in a $200,000 shovel loading bituminous coal (Fig. 2), it may shut down a fleet of mine trucks, a tipple, and a washing plant worth well over $1 million and, if the operator is particularly unlucky, he may have to buy coal from a competitor, temporarily to fulfill his contracts.

Dimes saved on delivery to the machine shop can multiply into dollars lost at the operating site, with surprising rapidity. The foundry must be prepared to deviate from its established practices, at some increase in its own costs if necessary, when this will accomplish a reduction in users' total costs.

The designer's job is to stand between manufacturing and the user, and understand and satisfy both. As both sometimes are rather temperamental, the designer can perhaps be forgiven for appearing slightly mad.

Thirty years ago, designers had to choose between bolted or riveted structures and castings. Even high production forgings were crude by present standards. One could well ask "What is the design engineer looking for?" Machines were increasing in size and power and users were demanding more reliable performance; riveted and bolted constructions were becoming inadequate and designers turned to castings. Designers needed big castings, sometimes thin and sometimes thick sections, more intricate configurations, fewer cracks and shrinks and blow holes, better alloys, and better heat treatment. Designers were pushing the foundries and asking for anything the foundries were willing to undertake.

But the picture has changed. Stamping, spinning, forging, hand welding from very thin to very thick sections, several automatic welding methods, and torch cutting of plates and slabs are all available, and in about as wide a range of materials as can be obtained in castings. And even plastics are displacing metals in an increasing number of instances. Today designers are becoming less interested in seeking new methods of construction and more interested in selecting from those already available, the best for each particular purpose.

Perhaps the title of this paper should be changed to read *"What the Foundry Should Do to Maintain the Designer's Interest."* All of the methods previously enumerated are being refined and improved, and are making inroads on castings. All stem from the rolling mill and so have a common interest in attacking cast-

Fig. 3 . . Lighter sections and less dead weight can increase earnings of this equipment by $20,000 a year.

ings. The foundry is a long way from obsolescence, but imagination and aggressive promotion will be necessary to prevent its gradual decline to a secondary position. There was a time when castings were used because there was no other way to attain the results desired, regardless of cost. Today, there are relatively few parts that cannot be made successfully in several ways, and castings are used simply because they are the least expensive.

Appreciation of what the job requires and imagination to attain it will help to keep foundry tonnage up.

Figure 3 shows a medium size dragline stripping anthracite coal. It takes about $3 worth of machine to suspend one pound of bucket and pay load at the end of this boom. If 1000 lb can be taken out of the 7000 lb-bucket and put into pay load, the user's income may be increased around $20,000 per year. If thin metal has adequate strength for a certain part in this bucket, any increase in thickness to allow for core shifts can be pretty expensive to the user. There are innumerable parts in this same position in many other type machines.

An increase in metal thickness to avoid difficulty in pouring large, thin sections has just as serious an influence. Dragline buckets originally were made largely of riveted plates. Because rivets would not stay tight, designers turned to extensive use of steel castings. Then welded plate construction replaced castings because the foundry asked for metal thicknesses in excess of strength requirements, to pour the large areas required. Now, with improved foundry technique and metal chemistry, there is a trend back toward castings.

A winch frame used on crawler tractors in the logging industry, has a complicated form the designers felt was needed for the job, but it gave trouble in the foundry. Had the foundry insisted on simplification, performance of the winch might have been reduced, and the designers could have given serious consideration to a welded structure. Pacific Car & Foundry Co. solved this problem by making the frame of several pieces (Fig. 4) and welding them together (Fig. 5). The foundry undertook this job of welding so that a complete unit could be furnished to the machine shop. By keeping the whole job within their own jurisdiction, they have

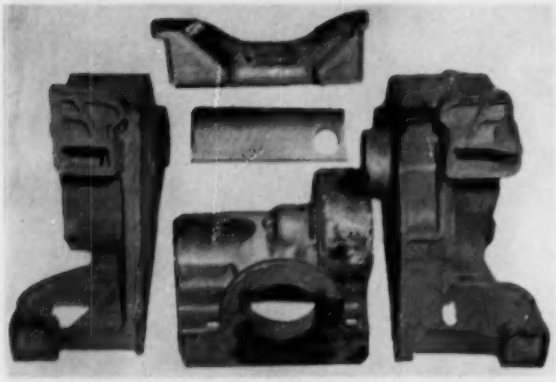


Fig. 4 . . Cast components of complicated logging winch frame which, as single casting, gave trouble in foundry.

PACIFIC CAR & FOUNDRY CO.

Fig. 5 . . Cast-welded assembly of winch frame simplified production, kept job in foundry, eliminated handling.

been able to produce parts accurately enough to avoid all premachining. There is single responsibility, just as there is for a casting. Stress relieving or heat treating can be accomplished without additional handling.

A good deal of emphasis is being placed on the advantages of composite construction, welding castings for complicated sections and plates for large, plane areas into a single part. This move seems highly commendable. Foundries might give serious thought to doing this job completely themselves, taking full responsibility for the proper distribution, and the location and design of the joints.

Both the designer and the foundry like clean, simple design. When a designer goes to a complicated design, he does it for a reason. It may be good or it may be bad but, nevertheless, he feels that it is necessary and that the final machine will perform better because of it. The foundry has a right and a duty to offer constructive criticism and ask questions, but the foundry seldom is sufficiently familiar with service requirements to condemn. And from a selfish viewpoint, they probably should not. The simpler and cleaner the design, the easier it is for other forms of construction to compete with castings.

Casting Industry's Biggest Asset

Foundries as a rule do not like complicated forms, a lot of ribbing in closed sections, changing metal thicknesses, a lot of coring. But their ability to make such parts is perhaps their biggest asset. No other method of manufacture has like flexibility in these respects, and foundries may well exploit this with continuing study of the problems involved. In cases of large production quantities, the foundry might even take the initiative in making sample castings of several designs and testing them for metal soundness, static or impact strength, or endurance.

Henry Ford is said to have had as a motto "One Piece and No Finish." This certainly is the complete picture of low cost manufacture. The "one piece" part fits the foundry. But foundries can get careless about "no finish." The location of gates and risers and the care with which they are cut off may have considerable effect on machining costs.

Figure 6 is a casting drawing on which the size and location of risers have been specified after foundry consultation. (For clarity in presentation, a simple design has been chosen and dimensioning of both riser pads and the part itself has been omitted. Advantages of this method are greater in the more complicated frame structures.) This has proved beneficial in several respects: the foundry and the designer become more familiar with each other's problems; risers are located so that the rough cut-offs can be dressed with minimum extra machining operations; riser bosses sometimes can be used as a functional part of the casting; and the designer knows whether or not risers will interfere with bolt locations or take up clearance space that he has counted on.

When a casting is shaken out of the sand it is a pretty rough looking thing. There is little to suggest that it should be handled with care. Yet care in handling should not be neglected. Figure 7 is a group of sheaves at the upper end of a crane boom. Cast grooves in sheaves up to 30-in. diameter for 1-in. wire ropes, when well made, are perfectly satisfactory on excavators. The number of good sheaves delivered is ample evidence that they leave the mold in satisfactory shape, and the cast groove eliminates an expensive machining operation. But the groove flanges are relatively thin and the rims are light; if sheaves are shaken out, or piled for washing, or carelessly loaded for shipment with much heavier castings, flanges are likely to be deformed enough to rapidly destroy the rope.

Deformed and distorted small castings do not fit machining jigs and fixtures, require individual set-ups, and create an expensive problem in the machine shop.

Designers naturally want sound castings. A 26-in. diameter hydraulic jack operating at 3000 psi pressure, originally was a forging. During the war, when large forgings were unobtainable without top priority, some other source had to be found, and the Bucyrus-Erie foundry accepted the job with some misgivings. The cylinder and ram were cast on end with excess metal and ample risers as shown in Fig. 8. Inspection has been by hydraulic pressure testing after completion. Both manufacturing cost and performance were so satisfactory that this construction was continued after the war, and there are now well over 50 similar units in service. As designed, all welds normally are in compression, although there may be appreciable bending at the lower ram weld in service.

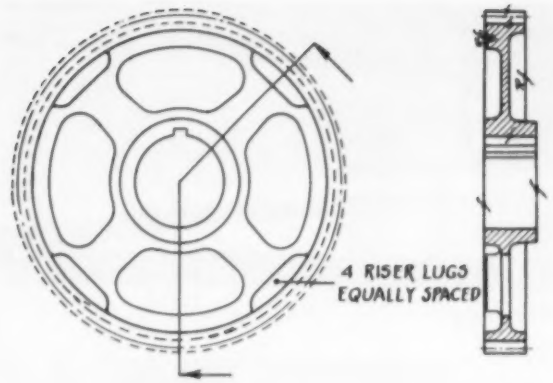


Fig. 6 . . Simplified casting drawing with riser location specified. Practice avoids costly extra operations.

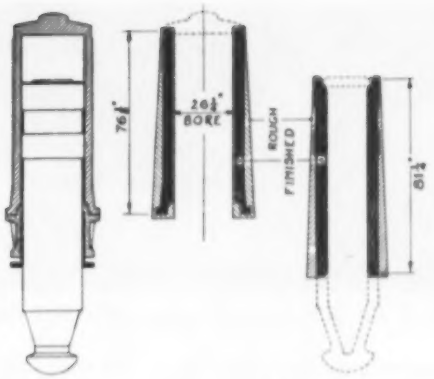


Fig. 8 . . Hydraulic cylinder and ram, formerly forged, are now cast with both cost and performance advantages.

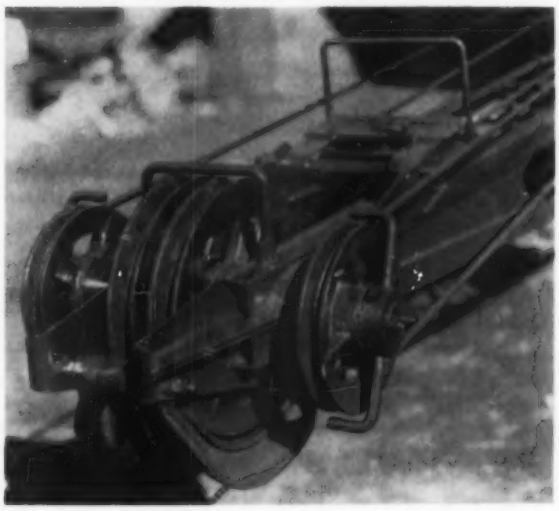


Fig. 7 . . Careless handling in foundry can deform thin castings, resulting in poor fits in machining jigs and fixtures or in faulty operation of casting.

But sound castings are not always as certain of attainment, and may not always be necessary. Figure 9 is a cast rail subjected to very high roller loads, in which flaking has occurred to about ¾ in. depth. Figure 10 shows two sections through this rail. The first view shows deep flaking with no apparent influence from a shrinkage cavity; the second view shows no flaking in less dense metal. Apparently the shrink has done no harm and it would be uneconomic to go to special practices to eliminate it. Replacement of this part is difficult, and even one or two per cent failures are taken seriously. Magnetic particle inspection for surface flaws has revealed little, so ultrasonic surveys recently have been instituted in a search for imperfections slightly below the surface in the zone of maximum shear.

The advisability of careful inspection for both surface and subsurface deflects in initial castings is obvious, although frequently it is neglected. A considerable number of machines may reach the field before a consistent undetected flaw develops to failure, and then replacement can be very expensive. Confidence in the machine also may be jeopardized, with serious affect on sales. A change in foundry practice or even a new pattern which is not an exact duplicate of the first, can be very upsetting to both designer and shop. A satisfactory part suddenly develops trouble for no apparent reason, and there may be stocks of semi-finished and finished parts of unknown quality for which disposition must be made.

For high production parts, sectioning initial castings for visual inspection is the most satisfactory method as the loss of two or three pieces in an order for several hundred is inconsequential. If the order is for only a few parts the loss through sectioning is prohibitive, and non-destructive methods, such as x-ray and ultrasonics, should be exploited. These methods might be used to advantage on certain production parts also, not for the purpose of acceptance or rejection, but to study the internal condition of parts which are performing satisfactorily in order to learn more of what lack of soundness can be tolerated with safety. The easiest way to convince a designer that 100 per cent soundness is unnecessary is to show him that he has not been getting it in similar parts in the past.

It may not be universal, but there does appear to be a general foundry resistance to inspection for soundness. When such inspection is suggested foundries assume a defensive attitude and present innumerable reasons against it. The foundry is fearful that 100 per cent soundness, which may be virtually unattainable in some castings, will be demanded and nothing less will be accepted. Such fears are not without foundation; designers have made unreasonable demands. Better understanding is needed on both sides, and might be obtained by occasional inspections of various satisfactory parts. These inspections should be on the basis of quality control, to indicate that manufacturing is getting better or worse; they cannot be used to measure general acceptability because acceptability already would be established by satisfactory performance of the part. They also would serve as a comparison factor for criticizing pilot castings of new design.

Inspections of this sort can be carried out rather easily by sectioning a few castings from high production lots. But for small production lots non-destructive inspection methods will have to be used. Unfortunately

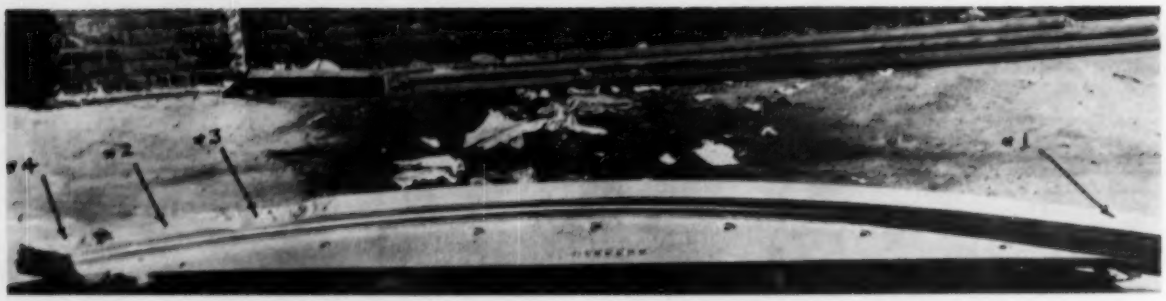


Fig. 9 . . Cast rail subjected to high roller loads. Note etched sections 2 and 3 below in Fig. 10.

these cannot be used universally, but their use whenever possible will advance their further development.

What a designer probably wants more than anything else is consistency in manufacture. He may like to complain, but he can learn how to live with almost anything when all pieces perform alike. But when each behaves differently in service, he is in complete confusion and does not know what to do. He will accept higher cost and sacrifice over all machine performance if necessary to get something on which he can rely.

Of course, the usual physical properties of tensile strength, yield point, ductility, low temperature impact, and endurance should approach, and exceed if possible comparable characteristics of other construction materials. For large castings alloying, when required should be adequate to develop good hardenability in thick sections. Except in highly specialized work, it is impractical for foundries to vary chemistry for each particular pattern; they must, therefore, endeavor to select a few chemistries each suitable for a wide range of properties.

Variations in the carbon range for each chemistry to suit particular requirements, sometimes are desirable. Controls for chemistry and heat treatment must assure uniformity of product. Mobility or transportability is of such importance today that the designer quite frequently is looking for the maximum strength per pound of weight.

Dimensional consistency frequently is essential for proper performance. Figure 11 shows the driving tumbler and track links for a 200-ton shovel. These parts are used without machining. Tumbler diameter and link pitch must be proportioned correctly for satisfactory operation. If both come to drawing, well and good. If either has a consistent deviation from drawing dimensions, adjustments can be made. But if deviations vary, one set may work well and the next poorly.

The foundry has played very important roles in the development of all types of machinery. Today it is encountering strong competition from other constructional materials. But it is the writer's sincere belief that foundries can meet this competition successfully so long as they recognize the strengths and weaknesses of their product.

Written discussion of this paper, Convention Preprint No. 55-126, should be sent to American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. The paper is one of 14 to be presented at the Steel sessions of the AFS Convention in Houston, May 23-27, 1955.

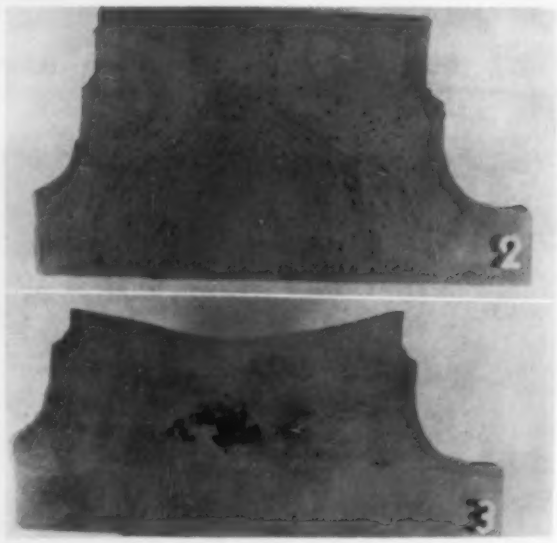


Fig. 10 . . Deep flaking and large cavity (below); no flaking above. Special practice to eliminate shrink in this cast rail is not warranted.

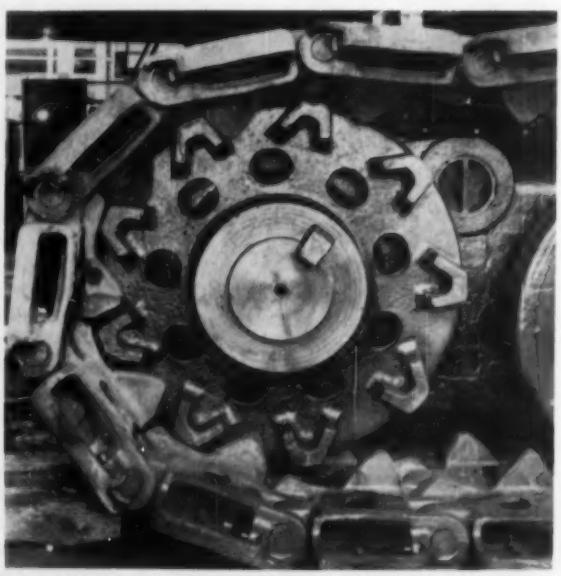


Fig. 11 . . Well-cast driver and tractor links for 200-ton shovel can be used as-cast without machining.

Calculation of Horizontal Gating Systems

JOHN G. KURA / *Chief Non-Ferrous Metallurgy*
Battelle Memorial Institute

■ One of the requirements of a good gating system is to supply clean liquid metal to the mold cavity. The more critical the need for a high degree of cleanliness in a casting, the greater attention should be directed to the gating system.

Research sponsored by the American Foundrymen's Society at Battelle Memorial Institute resulted in the following recommendations for horizontal gating systems:

1. Employ a pouring basin over the sprue.

2. Keep the lip of the pouring ladle low and direct the stream to the back of the pouring basin. Do not pour into the sprue hole.

3. Fill the pouring basin quickly and maintain it full throughout the pour to prevent the formation of a vortex that would suck air and dross into the sprue.

4. Use a tapered sprue with the larger end at the top to prevent aspiration of air and mold gases.

5. Use a sprue with the smallest cross section at the bottom that will prevent misrun of the casting.

6. Place a well at the base of the sprue to absorb some of the energy of the stream as it leaves the sprue. The well also creates a flow pattern that quickly clears this area of initial liquid which may be heavily laden with dross and gas.

7. Enlarge the cross-sectional area of the runner to several times the cross-sectional area at the base of the sprue to decrease the velocity of the liquid in the runner.

8. Make the total area of all of the gates equal to the area of the runner which connects the first gate to the well.

9. Decrease the area of the runner by the area of the gate as each gate is passed. This will cause all of the gates to feed the casting simultaneously and each gate will have approximately the same flow rate.

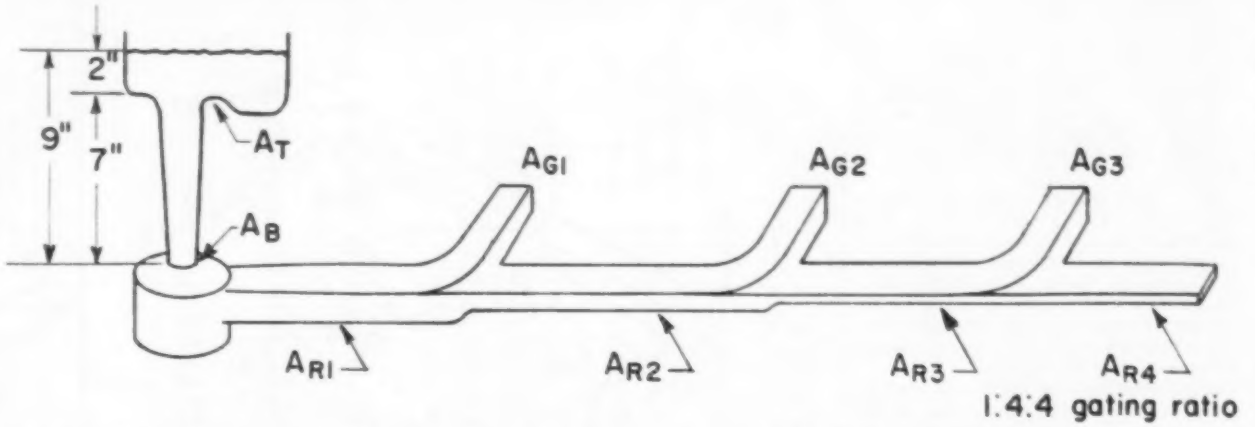


Fig. 1 . . One-runner horizontal gating system with circular sprue and 1:4:4 gating ratio with gates in cope and runner in drag.

10. Maintain runners in the drag and gates in the cope. Since runners will have to be filled before liquid will enter the gates, dross will be retained on the cope surface of the runners and clean liquid will enter the gates.

11. Provide a generous radius at all points where the direction of flow is changed. This applies to the hole in the pouring basin, to a runner that turns a corner, and to the gate coming off a runner. A generous radius prevents aspiration of air or mold gases into the liquid metal.

12. Extend the runner several inches past the last gate to entrap first metal poured which may contain dirt and entrained gases.

Following are formulas, factors, and examples of the procedure for calculating dimensions of one and two-runner systems.

A_B = Area at bottom of sprue, sq in.

A_T = Area at top of sprue, sq in.

$$A_B = \frac{W}{wV} = \frac{W}{w\sqrt{\frac{2gh}{\beta}}}; \quad A_T = A_B \sqrt{\frac{h_T}{h_B}}$$

w = Density of liquid metal, lb/cu in.
- = 0.086 lb/cu in. for aluminum
- = 0.055 lb/cu in. for magnesium
- = 0.289 lb/cu in. for copper
- = 0.252 lb/cu in. for gray iron
- = 0.250 lb/cu in. for 2% C steel

W = Flow Rate, lb/sec

V = Velocity, in./sec

g = 386 in./sec/sec

h_T = Total Head, in.

h_B = Head in pouring basin, in.

β = Factor to account for friction in the sprue*
- = 1.3 for a circular sprue
- = 1.8 for a square sprue
- = 1.9 for a rectangular sprue
- = 3.2 for a slot sprue

*according to D. S. Richins and W. O. Wetmore, *"Fluid Mechanics Applied to Founding,"* SYMPOSIUM ON PRINCIPLES OF GATING, American Foundrymen's Society, (1951) pp. 1-24.

Figure 1 . . Gating Dimensions

	Area sq. in.	Diam. in.	in. Wide	in. Deep
A_B	0.48	3/4		
A_T	1.02	1 1/8		
well	2.40	1 3/4		2 3/4
A_{R1}	2.00		1 7/16	1 3/8
A_{G1}	0.67		1 7/16	15/32
A_{R2}	1.40		1 7/16	31/32
A_{G2}	0.70		1 7/16	1/2
A_{R3}	0.74		1 7/16	1/2
A_{G3}	0.74		1 7/16	1/2
A_{R4}	same as A_{R3}			

One-Runner System

For the one-runner system illustrated in Fig. 1 it is assumed that a circular sprue is employed to pour an aluminum casting at a rate of 3 lb/sec. For this set of conditions the area at the bottom of the sprue is

$$A_B = \frac{3}{0.086\sqrt{2 \times 386 \times 9/1.3}} =$$

0.48 sq in. (3/4 in. diam). The area at the top of the sprue is

$$A_T = 0.48\sqrt{\frac{9}{2}} = 1.02 \text{ sq in. } (1\tfrac{1}{8} \text{ in. diam}).$$

The gating ratio for the system, 1:4:4, is the ratio of the area of the sprue at its bottom

to the area of the runners attached to the sprue to the total area of all of the gates coming off the runners. Thus, $A_{R1} = 4A_B = 4 \times 0.48 = 1.92$ sq in. This value may be rounded off to 2 sq in. Runner A_{R1} would have this area if it were 1 5/16 in. wide by 1 3/8 in. deep.

For a wide, shallow runner (or a square runner), the well at the base of the sprue should have an area five times the area at the bottom of the sprue. The well would be twice as deep as the runner. Area of the well is $5A_B = 5 \times 0.48 = 2.40$ sq in. Thus, the diameter of the well is 1 3/4 in. The depth of the well is twice the depth of the runner attached to the sprue. $2 \times 1\frac{3}{8} = 2\frac{3}{4}$ in.

If the dimensions of the runner were selected to make it narrow and deep, an enlargement of the runner at the base of the sprue would be somewhat more effective than a well. An enlargement is similar to a well, but does not extend below the runner. For a two-runner system, the enlargement has a diameter 2 1/2 times the width of the runner. For a one-runner system, the diameter is twice the width of the runner.

Area of first gate, $A_{G1} = A_{R1} \div$ total number of gates $= \frac{3}{5} = 0.67$ sq in.

Area of runner past first gate, $A_{R2} = (A_{R1} - A_{G1}) + 5\%$ for friction losses. Thus, $(2 - 0.67) + (1.33 \times 0.05) = 1.40$ sq in.

Area of second gate, $A_{G2} = A_{G1} + 5\%$. Thus, $0.67 + (0.67 \times 0.05) = 0.70$ sq in.

Area of runner past second gate, $A_{R3} = (A_{R2} - A_{G2}) + 5\%$. Thus, $(1.40 - 0.70) + (0.70 \times 0.05) = 0.74$ sq in.

Area of third gate, $A_{G3} = A_{G2} + 5\%$. Thus, $0.70 + (0.70 \times 0.05) = 0.74$ sq in.

Runner extension, A_{R4}, with same dimensions as A_{R3}, should be several inches in length to prevent backwash which would carry dross back into the last gate.

Two-Runner System

Figure 2 shows a two-runner system with a 1:4:4 gating ratio. Assume a circular sprue is used to pour aluminum at 4 lb/sec.

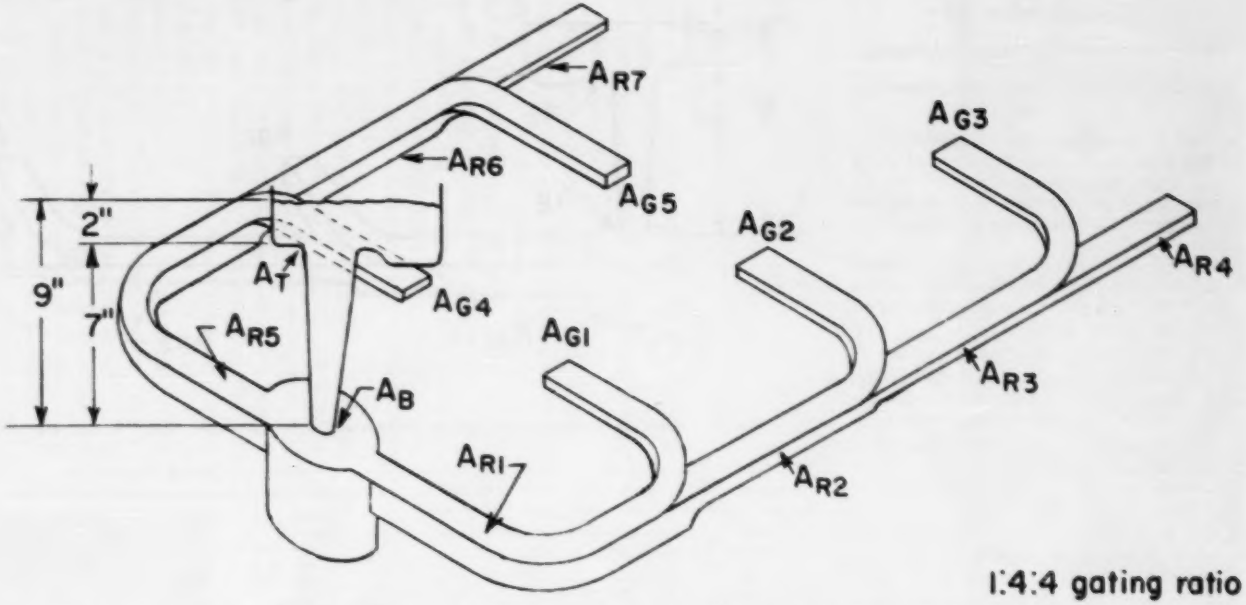


Fig. 2 . . Two-runner horizontal gating system with circular sprue and 1:4:4 gating ratio with gates in cope and runners in drag.

$$A_B = \frac{4}{0.086\sqrt{2 \times 386 \times \frac{9}{1.3}}} = 0.64 \text{ sq in.}$$

$$A_T = 0.64\sqrt{\frac{9}{2}} = 1.36 \text{ sq in.}$$

$A_{R1} = A_{R5}$; $A_{R1} + A_{R5} = 4A_B$

$A_{R1} = 2A_B = 2 \times 0.64 = 1.28$ sq in.

Well area $= 5A_B = 5 \times 0.64 = 3.20$ sq in.

Well depth = twice depth of runner attached $= 2 \times 1 = 2$ in.

$A_{G1} = A_{R1} \div$ number of gates attached to this runner $= 1.28 \div 3 = 0.43$ sq in.

$A_{R2} = (A_{R1} - A_{G1}) + 5\% = (1.28 - 0.43) + (0.85 \times 0.05) = 0.89$ sq in.

$A_{G2} = A_{G1} + 5\% = 0.43 + (0.43 \times 0.05) = 0.45$ sq in.

$A_{R3} = (A_{R2} - A_{G2}) + 5\% = (0.89 - 0.45) + (0.44 \times 0.05) = 0.46$ sq in.

$A_{G3} = A_{G2} + 5\% = 0.45 + (0.45 \times 0.05) = 0.47$ sq in.

$A_{R4} = A_{R3} = 0.46$ sq in.

$A_{G4} = A_{R3} \div$ number of gates attached to this runner $= 1.28 \div 2 = 0.64$ sq in.

$A_{R6} = (A_{R5} - A_{G4}) + 5\% = (1.28 - 0.64) + (0.64 \times 0.05) = 0.67$ sq in.

$A_{G5} = A_{G4} + 5\% = 0.64 + (0.64 \times 0.05) = 0.67$ sq in.

$A_{R7} = A_{R6} = 0.67$ sq in.

Figure 2 . . Gating Dimensions

	Area sq. in.	Diam. in.	in. Wide	in. Deep
A_B	0.64	31/32		
A_T	1.36	1 15/16		
well	3.20	2 1/32		2
A_{R1}	1.28		1 5/32	1
A_{G3}	0.43		1 5/32	11/32
A_{R2}	0.89		1 5/32	43/64
A_{G2}	0.45		1 5/32	23/64
A_{R3}	0.46		1 5/32	23/64
A_{G3}	0.47		1 5/32	3/8
A_{R4}	0.46		1 5/32	23/64
A_{R5}	same as A_{R1}			
A_{G4}	0.64		1 5/32	1/2
A_{R6}	0.67		1 5/32	17/32
A_{G5}	0.67		1 5/32	17/32
A_{R7}	same as A_{R6}			

Radiograph reveals several sand inclusions. These must be chipped out and repaired.

Later radiograph shows repairs have made the casting sound—saved the cost of re-casting.

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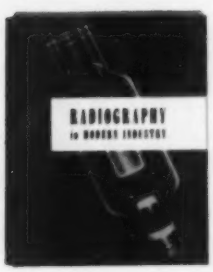

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California Regional Stresses Quality Castings Production

HERBERT F. SCOBIE/*Editor*

CALIFORNIA foundrymen holding their second regional foundry conference met at the Huntington-Sheraton Hotel, Pasadena, March 25 and 26, for a two-day round of technical discussions. Some 250 members of the Northern and Southern California Chapters of the American Foundrymen's Society, sponsors of the conference, heard talks covering gating and risering, production of aluminum and copper-base alloy castings, welding, and sand reclamation and control. A program for the ladies was held simultaneously. Conference chairman was William C. Baud, Mechanical Foundries Div., Food Machinery Co., Vernon Branch, Los Angeles. Technical chairman was Otto H. Rosentreter, Otto H. Rosentreter Co., South Gate.

The conference opened with a luncheon at which Myron B. Niesley, California Testing Laboratories, Inc., Los Angeles, presided. Conference Chairman Baud cited committee workers and Charles R. Gregg, Gregg Iron Foundry, El Monte, chairman of the Southern California Chapter of AFS, welcomed conference attendants.

Herbert F. Scobie, editor, AMERICAN FOUNDRYMAN, spoke briefly on high lights of the coming AFS Convention in Houston, May 23-27, and told how readers of "The Foundrymen's *Own* Magazine" can repay authors of papers for sharing their foundry experience. Return the favor by submitting a paper describing some technique or operation in your plant, he said, so authors of papers that have helped you will in turn benefit from your ideas.

Four technical papers were presented the afternoon of the first day. At simultaneous sessions, Harry H. Kessler, Sorbo-Mat-Process Engineers, St. Louis, spoke on *"Improved Methods in Foundry Practice"* while Donald L. LaVelle, Federated Metals Div., American Smelting & Refining Co., South Plainfield, N. J., spoke on *"Major Factors Influencing the Quality of Aluminum and Copper-Base Alloys."* At the late afternoon meetings,

Chairmen of some of the California Regional Foundry Conference activities were, left to right: Stanley Raven, Snyder Foundry Supply Co.—Registration; Rayburn E. Orr, Howell Foundry Co.—Tickets; William Baud, Mechanical Foundries Div., Food Machinery Corp.—General Chairman; Warner Stenberg, U. S. Electrical Motors, Inc.—Publicity.

Ladies activities included two conference luncheons and a number of special events.

Malcolm MacGregor, General Metals Corp., Oakland, presented *"Scientific Approach to the Feeding of Castings,"* and Roy E. Paine, Aluminum Co. of America, Vernon, spoke on *"Production of Aluminum Alloy Specification Castings."*

Mr. Kessler stressed the importance of consistent high quality in castings and said this calls for consistency in operations and materials. In solving casting soundness problems, he said, consider first the metal composition, then risering, chilling, and finally a design change. Maintain consistent charging practice, melt hot to get clean iron, and pour hot, he advised. He recommended using side risers for iron whenever possible.

Session chairman was E. G. Geskell, Ace Foundry, Ltd., Huntington Park; vice-chairman was B. M. Campbell, Dayton Foundry, Hollydale.

Mr. LaVelle explained that the basic principles for handling aluminum and copper alloys in the foundry are the same, but the differences that do exist between these alloys cause emphasis to

Conference speakers included, left, Herbert F. Scobie, editor, AMERICAN FOUNDRYMAN, and Charles Gregg, Gregg Iron Foundry, Southern California Chapter president.

be placed on different phases of foundry practice for each. With aluminum, the small difference in density between the metal and its oxides necessitates care in pouring and transfer to prevent mixing of the metal with the dross. Copper alloys are much less critical in this regard because dross and oxides are light with respect to the metal and are rapidly and easily separated.

With so much emphasis having been placed upon melting practice for copper alloys in recent years, what is probably the foremost cause of bad castings—poor gating practice—has been overlooked, LaVelle said. Alloys of the red brass type are generally so easy to cast that good, sound gating is not used, which results in bad castings when all factors are not right. Proper gating is even more important for the higher shrinkage and more drossy alloys such as aluminum and manganese bronze.

Aluminum is more sensitive than brass to improper gating since shrinkage is readily caused by hot spots which result from poor distribution of the metal flowing into the mold cavity, according to LaVelle. The use of too few gates is a common fault. Defective castings most commonly encountered are caused almost equally by bad pouring practice or poor gating. Chairman at Mr. LaVelle's session was C. J. Egetter, Crown Brass Mfg. Co., Los Angeles.

Mr. MacGregor outlined the principles of heat flow in sand and metal and described the use of the freezing ratio curve in the risering of steel castings. He reviewed the work of Pellini and his associates in determining the feeding range of risers, the effect of joining sections, and influence of chills.

Arnold K. Steger, Hanford Foundry, San Bernardino, was chairman of the session. Vice-chairman was Harold E. Simmons, AiResearch Mfg. Co., Los Angeles.

Mr. Paine pointed out that aluminum castings do a serviceable job in many highly stressed applications and are being used increasingly because of production economy. He described procedures used in founding of aircraft and similar quality castings, including inspection procedures and a records system with a card covering each operation. Importance of determining casting properties was brought out by an example that showed test results on attached bars to be opposite those obtained on the castings made by two different foundry techniques.

Chairman of the session on aluminum was Fred E. Dye, Burndy Engineering Co., Inc., Lynwood. Hallet Watson, South Gate Aluminum & Magnesium Co., South Gate, was vice-chairman.

At the conference dinner, B. G. Emmett, Los Angeles Steel Casting Co., a regional vice-president of AFS, presided and introduced past presidents of the Southern California Chapter. Northern California past presidents were introduced by John R. Russo, Russo Foundry Equipment Co., Oakland. The dinner was preceded by a fellowship hour at which Columbia-Geneva Steel Div., U.S. Steel Corp., played host.

Technical speaker following the conference dinner was Jonathan Marden, Eutectic Welding Alloys Corp., New York. Session chairman was Charles F. Weisgerber, Alloy Steel & Metals Co., Los Angeles. James E. Eppley, Axelson Mfg. Co., Vernon, was vice-chairman.

Mr. Marden gave as foundry uses of welding: repair of broken parts, overlaying for wear resistance, fabrication of special equipment, castings salvage, and cleaning. He described removal of gates and risers with a cutting electrode and cleaning for weld salvage by means of a grooving electrode. Technical know-how and manipulative skill are needed for a satisfactory welding job, he said. The former is the more important, he declared, stating that it consists of identification of the metal to be welded, proper joint design, selection of welding process from among 37 available, and selection of welding material designed for the job. He concluded his talk with a color-sound film illustrating welding techniques.

General conference chairman was William Baud (left), Southern California Chapter vice-president; Otto H. Rosentreter, Otto H. Rosentreter Co., was technical chairman.

Speakers the morning of the second day, and their subjects were: Wm. D. Emmett, Los Angeles Steel Casting Co., *"Making Castings with Sand Reclaimed by the Dry Method,"* and John J. Stobie, Jr., Apex Smelting & Refining Co., Long Beach, *"Popular Aluminum Casting Alloys."*

Mr. Emmett reviewed the four basic methods of sand reclamation—wet, thermal, combination of wet and thermal, and dry or pneumatic—and described his company's dry unit which handles 20 tons per hour. Hot sand is a major cause of trouble, he said in pointing out that his sand after reclamation is not over 20F above room temperature.

Emmett described experiments with different types of binders and mixing times made to improve erosion resistance of the reclaimed sand. Oxide content and heating of the sand due to pouring were demonstrated not to be causes of erosion. Quick test for erosion used by the speaker consists of dipping a standard 2 x 2-in. sand specimen into a riser to envelop it with a thin sheath of metal. The coated specimen is then worked up and down in a ladle of hot metal until the sheath melts off, and the sand surface is examined for resistance to erosion.

Session chairman was Hubert Chappie, National Supply Co., Torrance; vice-chairman was William Mitchell, Utility Steel Foundry, Vernon.

Elements that were once considered impurities—iron, zinc, manganese, magnesium—are now being put to work as alloying constituents, Mr. Stobie said. He discussed the foundry characteristics of the major groups of casting alloys and their use in sand casting, permanent mold casting, and die casting. He concluded by pointing out that secondary aluminum alloys are as good as primary alloys if the impurities are controlled.

Robert R. Haley, Advance Aluminum & Brass Co., Los Angeles, was chairman of the aluminum session; vice-chairman was Thomas Jasmin, Arcee Foundry, South Gate.

Leonard O. Hofstetter, Brumley-Don-

aldson Co., Huntington Park, presided at the second day's luncheon.

In the afternoon, another pair of simultaneous sessions featured Harold E. Henderson, H. C. Macaulay Foundry Co., Oakland, speaking on *"Principles of Sand Control,"* and Wm. M. Ball, Jr., R. Lavin & Sons, Cincinnati, on *"Effective Essentials Required to Make Good Castings."*

Mr. Henderson directed his listener's attention to the many variables of molding and core sand that must be controlled, and the compromises in properties that must be made. He emphasized the importance of minimizing mold wall movement to help eliminate metal shrinkage, stating that mold deformation probably has been responsible for more defective castings than any other type of sand failure. In most instances excess moisture is to blame, he said.

Continuing on moisture control, Henderson said that as little as 0.1 per cent water can make the difference between success and failure on a highly critical job. Each foundryman must determine for himself the exact amount of moisture his sand requires.

At Henderson's session, Robert Gregg, Reliance Regulator Div., American Meter Co., Alhambra, was chairman, and Morris Gittleman, Pacific Cast Iron Pipe & Fitting Co., South Gate, was vice-chairman.

Foundrymen should not overlook the simple answers to problems in their search for new materials and processes that seem to be panaceas, Mr. Ball said in his talk on effective use of men, materials, and machines. Good pattern equipment is needed for simple, speedy molding, he pointed out, and flasks should be sufficiently large for proper gating and risering.

Ball advised using strainer cores and gating into risers. Check whether a riser is feeding properly by sectioning it lengthwise and etching with acid. Note whether the shrink extends into the riser neck and the casting, he said. C. W. Ammen, Ammen Non-Ferrous Corp., Los Angeles, was session chairman. Fred Jones, James Jones Co., El Monte, was vice-chairman.

Conference attendants assembled for the final technical session to hear Michael Bock II, Exomet, Inc., Conneaut, Ohio, speak on *"Gating and Risering of Castings as Affected by Exothermic Materials."* Chairman of the session was Phil C. Rodger, General Metals Corp., Los Angeles. Vice-chairman was Martin G. Dietl, Western Brass Works, Los Angeles.

Radiation losses are more significant on the larger risers, Mr. Bock stated. These can be cut down by the use of materials such as perlite, fly ash, rice hulls, graphite, and charcoal. Mildly exothermic materials available burn a little, then form a loose, insulating cover over the riser. Other materials, progressively more effective, are the highly exothermic nonmetal producing materials, and the highly exothermic metal producers. Exothermic materials should pay off in the cleaning room as well as in sounder castings, he said.

Conference sessions were brought to a close with Charles Gregg making a presentation to Conference Chairman Baud. Mr. Baud in turn thanked speakers, session chairmen and vice-chairmen, and committee workers for their participation. The conference concluded with a fellowship hour hosted by Kaiser Steel.

Conference committee members, in addition to General Chairman Baud and Technical Chairman Rosentreter, were: Arrangements, Robert M. Ditmore, Red Seal Metals Co., South Gate, and William C. Cameron, Federated Metals Div., American Smelting & Refining Co., Los Angeles; Northern California Participation, John Russo; Publicity, Edward Haines, H. Kramer Co., El Segundo, and Warner Stenberg, U.S. Electrical Motors, Inc., Los Angeles; Housing, Bruce Farrow, Barker Foundry Supply Co., Los Angeles; Reception, Jack Crawford, Independent Foundry Supply, Los Angeles; Tickets, Rayburn E. Orr, Howell Foundry Co., Inc., Los Nietos; Registration Stanley C. Rauen, Snyder Foundry Supply Co., Los Angeles; and Ladies Entertainment, Mrs. Charles R. Gregg.

Joe Meyer, Snyder Foundry Supply Co., whose hobby is orchid growing, supplied orchids for the ladies from his own greenhouse. Conference photographs are by A. P. Griffith, General Refractories Co., Los Angeles.

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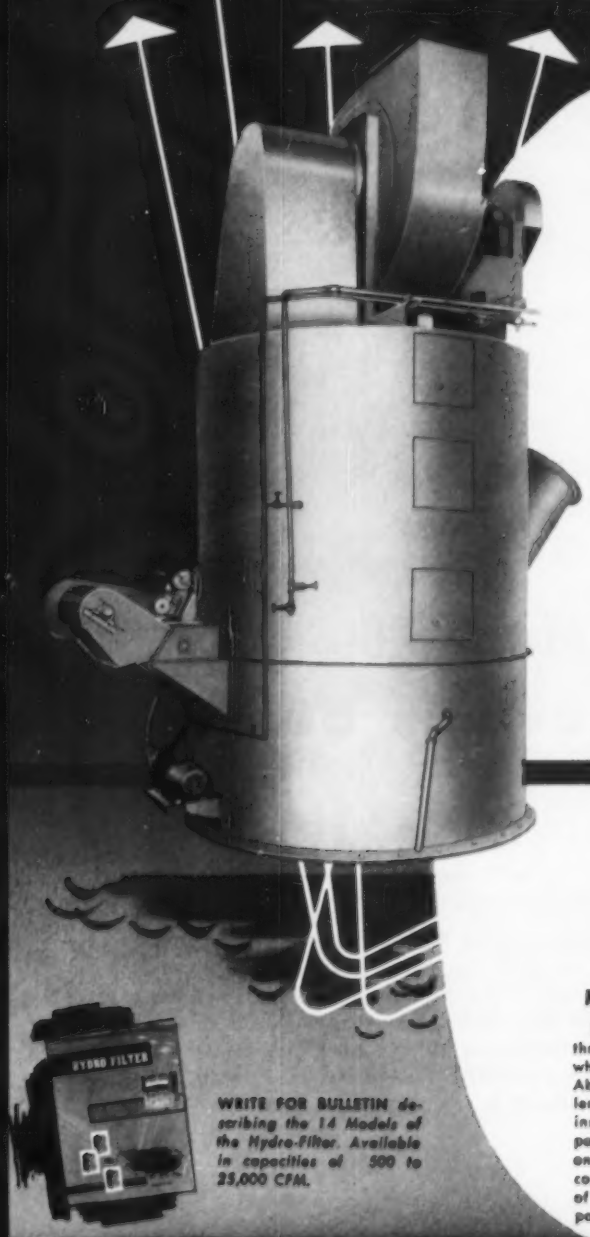

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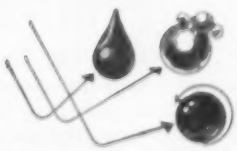

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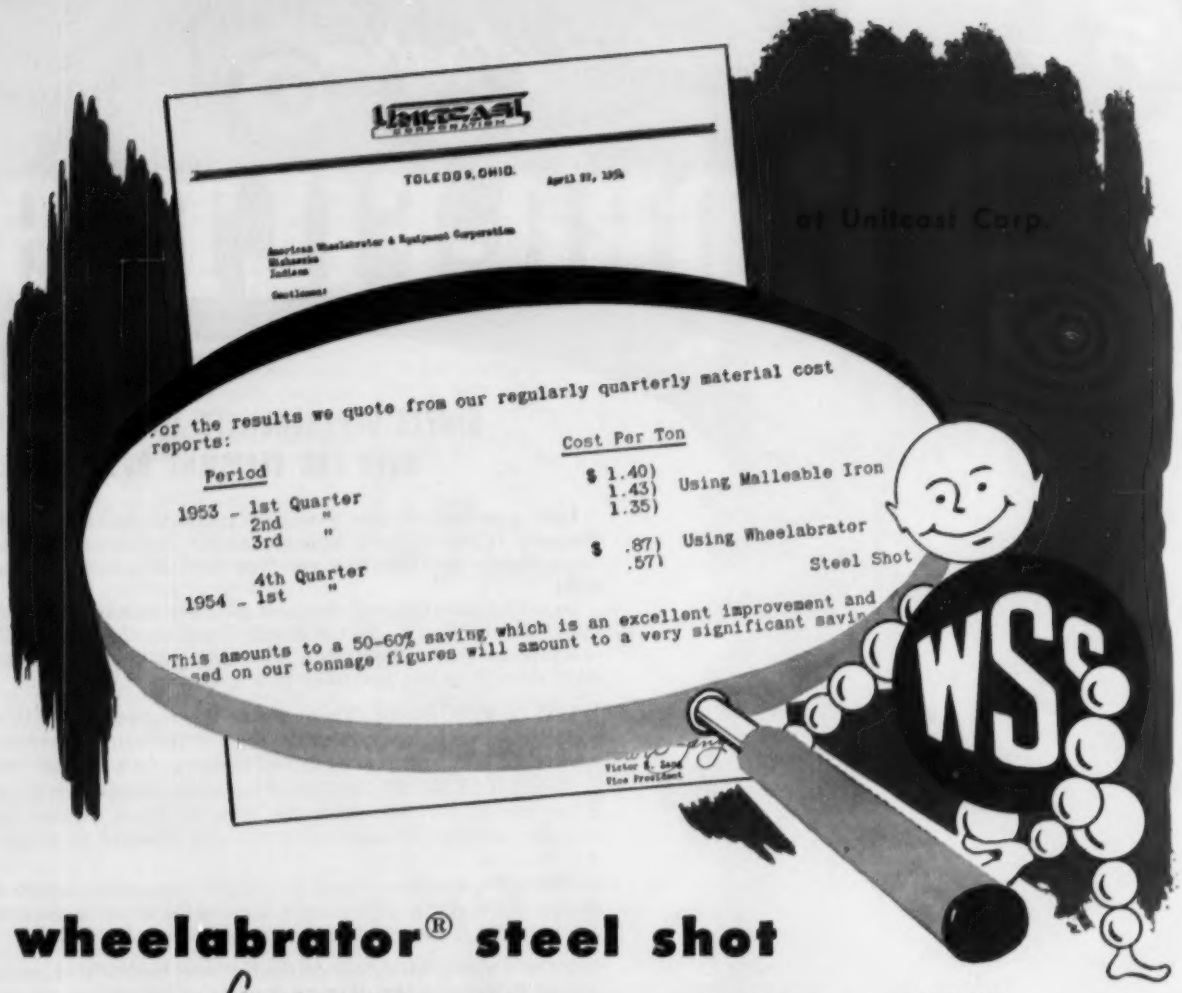

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Steel Founders Elect, Present Awards

HERBERT F. SCOBIE/*Editor*

A. J. McDONALD, American Steel Foundries, Chicago, was elected to a third term as president of the Steel Founders' Society of America at its 53rd annual meeting at the Drake Hotel, Chicago, March 14 and 15. Other highlights of the meeting included presentation of the Lorenz Medal to Ross L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., and presentation of Product Development Contest awards.

In addition to heading S.F.S.A., Mr. McDonald will also serve as chairman of the Executive and Budget Committees for the ensuing year. He is a former director of S.F.S.A., vice-president, Technical and Operating Committee member, first chairman of its Product Development Committee in 1949, and was awarded the society's Lorenz Memorial Medal for service to the industry in 1950.

H. L. McClees, Crucible Steel Casting Co., Lansdowne, Pa., is the new vice-president. Other newly elected officers of S.F.S.A. include directors A. T. McKee, Strong Steel Foundry Co., Buffalo; T. F. Dorsey, Pittsburgh Steel Foundry Corp., Glassport, Pa.; G. W. Myers, Crucible Steel Casting Co., Milwaukee; and W. D. Bailey, Jr., Westlectric Castings, Inc., Los Angeles.

Directors serving the second of their two-year terms include A. S. Trowbridge, Dibert, Bancroft & Ross Co., Ltd., New Orleans; J. L. V. Bonney, Jr., Bonney-Floyd Co., Columbus, Ohio; and H. F. Park, Jr., General Steel Castings Corp., Granite City, Ill.

Staff officers are F. Kermit Donaldson, executive vice-president, Charles W. Briggs, technical and research director, and George K. Dreher, secretary.

Committee chairmen appointed to serve for the ensuing year include: W. H. Worrilow, Jr., Lebanon Steel Foundry, Lebanon, Pa. — Advertising, Public Relations, and Education Committee; A. M. Slichter, Pelton Steel Casting Co., Milwaukee—Market Research Committee; W. H. Muchnic, Locomotive Finished Material Co., Atchison, Kan.—Product Development Committee; E. M. Layman, General Steel Castings Corp., Granite City, Ill.—Safety Committee; R. H. Frank, Bonney-Floyd Co., Columbus, Ohio—Specifications Committee; H. L. Holtz, Sivyer Steel Castings Co., Milwaukee—Statistical Reports Committee; R. C. Wood, Minneapolis Electric Steel Castings Co., Minneapolis—Technical and Operating Committee; and H. D. Phillips, Adirondack Foundries and Steel, Inc., Watervliet, N. Y.—Technical Research Committee.

The Lorenz Memorial Gold Medal was awarded to Mr. Gilmore for his service to S.F.S.A. and the industry. A leader in the use of brittle lacquer and strain gauge techniques, his steel Founders activities include: Chairman, Personnel Committee, 1945; member of the Research Fund Committee, 1949 and 1950; Technical & Operating Committee, 1951-54; trustee of Foundry Educational Foundation representing the Steel Founders' Society, 1953 and 1954; director of Division 6 of the Steel Founders' Society, 1946-48; and chairman of National Product Development Committee, 1951 to 1954. Mr. Gilmore is also a member of the board of directors of Malleable Founders' Society.

Winners in the 1954 Product Development Contest of the Steel Founders' Society of America include, standing left to right: Vernon Lich, General Steel Casting Corp., Granite City, Ill.; David P. Miller and Sands G. Falk, Falk Corp., Milwaukee; Roy W. Daub, Lebanon Steel Foundry, Lebanon, Pa.; and Robert J. Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Seated, left to right, are: Ross L. Gilmore, Superior Steel & Malleable, chairman, Product Development Committee and 1955 Lorenz Medallist, and A. J. McDonald, American Steel Foundries, re-elected president of S.F.S.A. for a third term.

The objective of the Product Development Contest was the development of designs that would improve the overall product, reduce costs, improve casting quality, and bring the many advantages of steel castings to the attention of design and product engineers. Awards were made in two categories: Class I, member foundries of the society; and Class II, steel castings users. Award winners in Class II include: 1st place, $1000, R. E. Groethe, Corning Glass Works, Corning, N. Y., *"Contour Chill Castings are Foolproof Tools for Industry"*; 2nd place, $500, Charles L. Babb, Allis-Chalmers Mfg. Co., Milwaukee, *"Cast Steel Weldments Form Centrifugal Pump Barrel"*; 3rd place, $250, R. P. Fox, Clyde Iron Works, Duluth, Minn., *"Forged to Cast Steel Hooks."*

Award winners in Class I, include: 1st place, $1000, Sands G. Falk and David P. Miller, Falk Corp., Milwaukee, *"Now It Can Be Cast;"* 2nd place, $500, Robert J. Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., *"A Method of Product Development."* Third place was a tie with $250 going to each winner: Vernon Lich, General Steel Castings Corp., Granite City, Ill., *"Cast-Weld Shakeout Unit,"* and Roy W. Daub, (accepting for the engineering staff) Lebanon Steel Foundry, Lebanon, Pa., *"Cast Louver Grill Door Replaces Fabricated Louver Grill Door for M-48 Tank."*

Honorable Mention awards were made to the following in Class I: M. R. Atwater, Kay-Brunner Steel Products, Inc., Alhambra, Calif.; N. B. Akitt, Adirondack Foundries and Steel, Inc., Watervliet, N. Y.; R. N. Dobson, Dominion Foundries & Steel, Ltd., Hamilton, Ont.; R. S. Nobles, Mountain State Steel Foundries, Inc., Parkersburg, W. Va.; L. S. Krueger, Pelton Steel Casting Co.

Honorable Mention awards went to the following steel castings users: W. W. Young, D. J. Sparr, E. F. Buchanan, and F. K. Rader, Flexible Co., Loudenville, Ohio; T. R. Linskey and O. L. Borgerson, Fisher Governor Co., Marshalltown, Iowa; A. P. Boh, Boh Brothers Construction Co., New Orleans; C. B. Neff, Wabash Drilling Co., St. Louis; W. J. Henry, Yale & Towne Mfg. Co., Philadelphia; R. R. Barber, Parsons Co, Newton, Iowa.

Trouble in the foundry

. . . or how Chuck Wright won a war against bugs

"Last month, Fred Hamlin, metallurgist for Ajax Engine Works, asked me to sit in at a conference.

"Several big wigs from Ajax attended," continued Chuck Wright, the INCO distributor foundry specialist. "The trouble was too many Diesel engine liners and heads from their own foundry, as well as from outside sources, were failing.

"The liner problem was the least serious, because sections were relatively uniform. By making slight adjustments of composition, several producers could meet Ajax specifications.

"But not so with cylinder heads. They had plenty of bugs.

"As you probably know, service stresses, for example, arise not only from gas pressures against a head, but also from wide temperature differences between surfaces exposed to combustion and those cooled by water jackets inside the head. Also, possibly some stresses remain after machining. Or due to faulty anneal. Invariably, stresses combine and move to the weakest point of the design. It's there that castings crack. Not necessarily where stresses originate.

"Of course, I knew that prior to 1950, Ajax specified 1.25-1.50% nickel for heads, and 1-1.25% for liners. Results? Excellent! Since 1950, however, in spite of advances in foundry technique, failures from accumulated stresses continued to trouble them.

"So when Fred stood up and asked for my opinion, I reminded the group of Ajax's past experience. Heavy up the walls, if possible but also add a little nickel for strength and uniform structure in both light and heavy sections. Also, for uniform hardness. Nickel promotes pressure tightness, too. And in cylinder heads it suppresses leakers. And insist, I warned them, on Type A – well distributed and uniformly small graphite . . . to keep mechanical and wearing properties on the favorable side.

"After that conference, Ajax *did* reinstate the nickel cast iron.

"Rejections are now down because the bugs are out. It's as simple as that.

"It's simple to reach me when *your* problem involves the metallurgy of castings. The easiest way is to drop me a line in care of INCO."

INCO TRADE MARK

Chuck Wright

The International Nickel Company, Inc.
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DOES YOUR COMMUNITY CONSIDER YOU A GOOD NEIGHBOR

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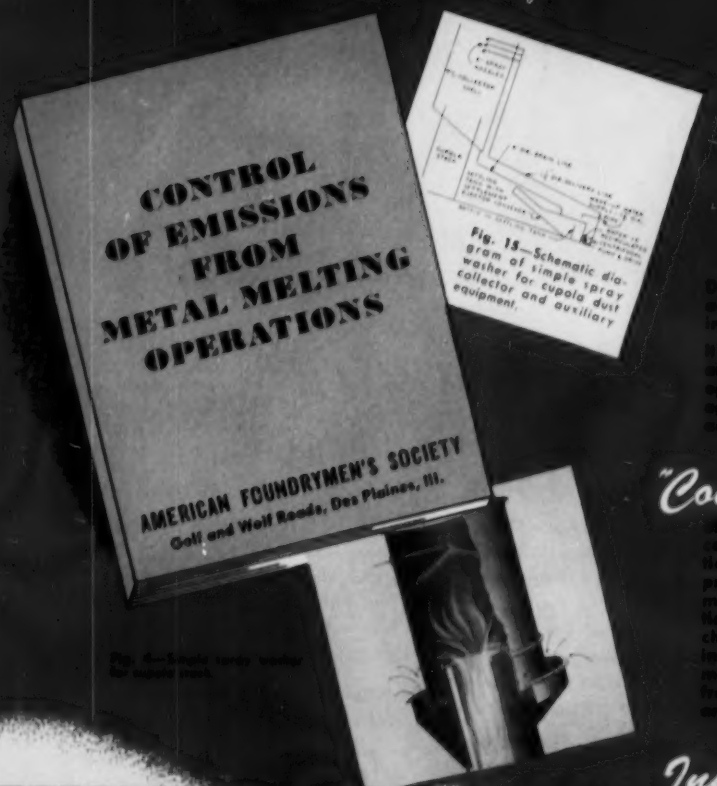
or...

do you, like so many other Industrialists, close your eyes to the offenses of your own Foundry?

AFS


CONTROL OF EMISSIONS FROM METAL MELTING OPERATIONS
AMERICAN FOUNDRYMEN'S SOCIETY
Golf and Wolf Roads, Des Plaines, Ill.
Fig. 15—Schematic diagram of simple spray washer for cupola dust collector and auxiliary equipment.

During the past 15 years the control of smoke and air pollution has been a growing municipal problem in cities throughout the United States.

It is to enable foundry management to adopt smoke and air pollution control measures for a specific operation in a given locale, as well as to municipal agencies, that the work of the AFS Safety-Hygiene and Air Pollution Control Program continues.

"Control...

"Emissions from Metal Melting Operations" is a comprehensive study prepared by the AFS Air Pollution Control Committee working on an industry-wide project. Bound in 8½ x 11-inch pamphlet form, the material deals with the general subject of air pollution and its control . . . describing the engineering characteristics of the various types of equipment now in actual service for controlling emissions from metal-melting operations. Typical operating data, obtained from installations of several types of equipment, also are included.

Information...

Contained in this pamphlet will provide foundry management with a valuable guide to the steps necessary for control of air pollution . . . in a manner that his plant may continue to operate as a "good neighbor," complying with local air pollution ordinances now in effect or, possibly, forthcoming soon!

Value of text is enhanced and clarified by practical illustrations, tables and an extensive bibliography.

Order copies for each member of your management staff... for the ready, helpful information that this 26 page booklet includes— $1.50 *to AFS Members;*
$2.25 *to Non-Members*

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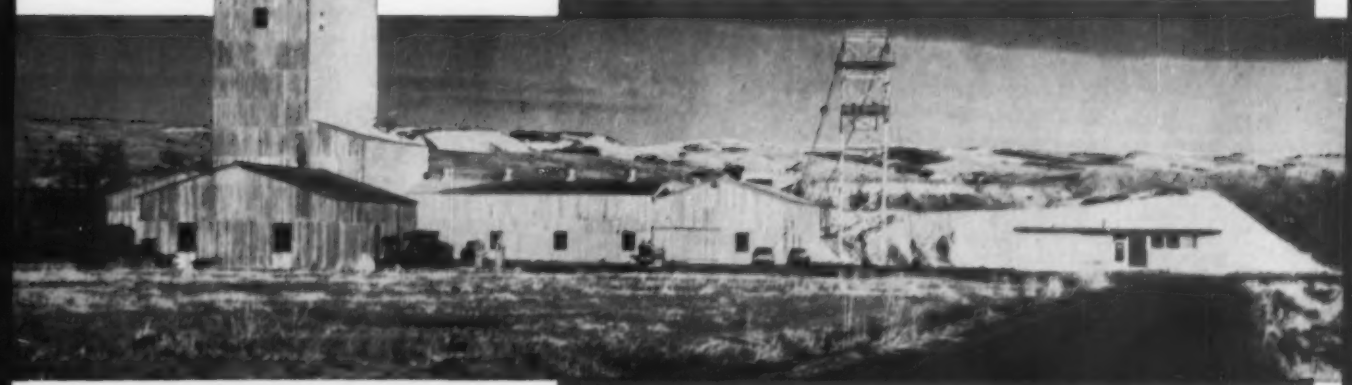
Comparative tests by an independent research laboratory* prove Yellowstone's superiority. Tests were made with an added clay content of 5%.

		GREEN PROPERTIES (a)					DRY PROPERTIES (b)	
	pH	Green Compressive Strength psi	Permeability AFS Units	Toughness psi (c)	Deformation in./in.	Hardness (d) AFS Units	Compressive Strength psi	Permeability AFS Units
Yellowstone	9.4	18.1	107	145	0.008	93	60.5	116
Western Bentonite A	8.9	12.5	92	140	0.011	86	64.3	108
Western Bentonite B	9.3	15.5	86	134	0.009	85	76.4	102
Western Bentonite C	9.7	12.9	95	126	0.011	88	29.0	108

(a) Standard AFS Procedures.
(b) Oven dried 2 hours at 220F to 230F.
(c) Product of green compressive strength (psi) and deformation (inches per inch).
(d) Hardness measured on bottom of rammed specimen.
*Name on request.



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Claude B. Schneible Dies Suddenly

CLAUDE B. SCHNEIBLE, president Claude B. Schneible Co., Detroit, died suddenly April 15 upon returning from the Foundry Equipment Manufacturers' Association's spring meeting in Washington, D. C.

Claude B. Schneible

Active in American Foundrymen's Society's affairs since 1916, Mr. Schneible was a national director of the Society and chairman of its Detroit Chapter for 1954-55. He was a past director of F.E.M.A. and was president of the organization in 1953. Also active in the Foundry Educational Foundation, Mr. Schneible served as a trustee, president, and chairman of the board. He was also a member of National Association of Manufacturers.

Long established in the foundry field, Mr. Schneible began his career during the summers while still in school by working as a draftsman for the Joseph Schneible Co., Chicago, from 1910 to 1915. After attending Northwestern University, he became associated with American Foundry Equipment Co., now American Wheelabrator & Equipment Corp., Mishawaka, Ind. Mr. Schneible formed the Claude B. Schneible Co. in Chicago in 1935 and moved it to Detroit in 1943.

Born in Brooklyn, N. Y., Mr. Schneible attended public school in Weehawken, N. J. Upon moving to the midwest, he attended Racine College, Racine, Wis., and Evanston Academy, Evanston, Ill.

Mr. Schneible held numerous patents on improvements of foundry ventilation and dust collection. He was an avid gardner, fisherman, and photographer.

Improved Exposure Calculator

British Steel Castings Research Association has announced that an inmproved Mark II model of their Radiographic Exposure Calculator has been produced having scales for use with the isotopes ^{137}caesium and ^{170}thulium, in addition to those for ^{60}cobalt, ^{192}iridium and radon which appeared on the earlier Mark I version. To meet demand from continental countries, a Mark III version of the Calculator has also been produced, in which metric scales replace the inch scales on the Mark II model.

Improvements have also been made in the general construction and appearance, and the length and thickness of the rule have been reduced to pocket size. Further information is available from the British Steel Casting Research Association, Broomgrave Lodge, Sheffield 10, England.

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of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

TO OBTAIN HIGH QUALITY CASTINGS

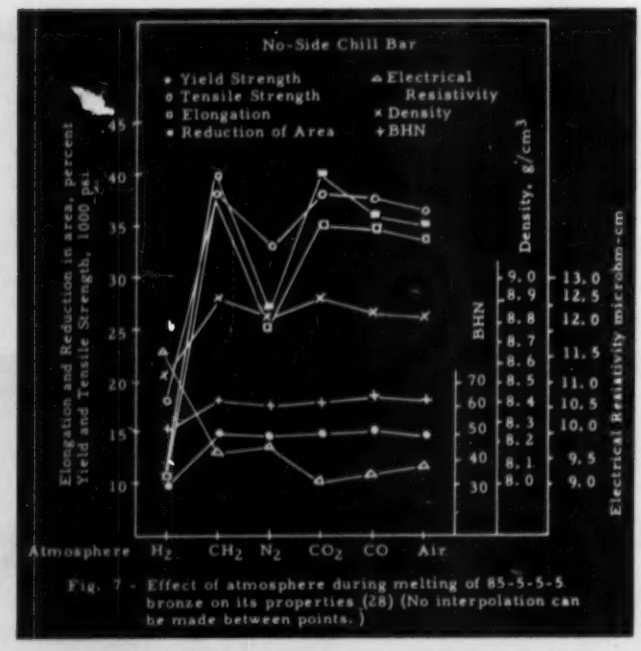

Fig. 7 - Effect of atmosphere during melting of 85-5-5-5 bronze on its properties (28) (No interpolation can be made between points.)

21 pp. 8 x 11 Paper Bound 10 Illustrations-Bibliography

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and

determine what factors affect pressure tightness in copper-base alloys

read

MELT QUALITY AND PRESSURE TIGHTNESS OF COPPER-BASE ALLOYS

Sponsored at Battelle Memorial Institute under supervision of the AFS Brass and Bronze Division's Research Committee, this survey traces factors affecting melting quality and pressure tightness of copper-base alloys, especially red brass. Causes of unsoundness and methods available to avoid gassing are concisely covered. Suggestions on how to obtain high quality and pressure tight castings are included, as is a list summarizing recommended good foundry practice. This booklet is an invaluable reference for foundrymen and metallurgists engaged in the production of copper-base alloys castings.

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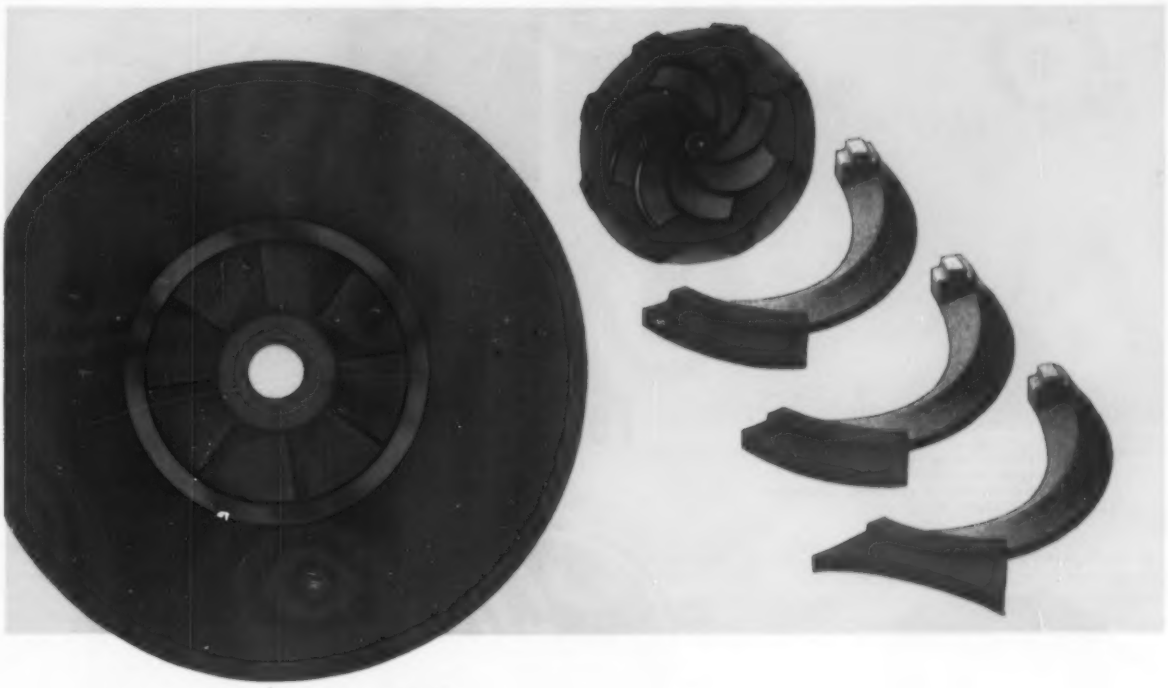

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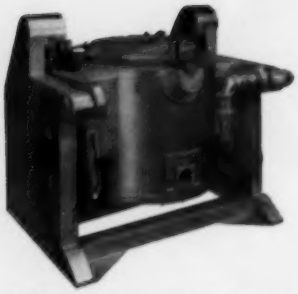

Lindberg-Fisher type MNP nose-pour tilting crucible furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to #800 crucible with brass, up to #1000 crucible with aluminum. Oil or gas fired. Described in Bulletin 57-A.

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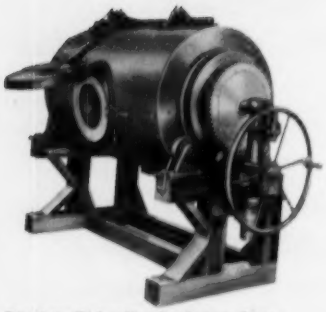

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Expect Pearlitic To Expand Malleable Market

HERBERT F. SCOBIE / *Editor*

Nearly 100 attended the M. F. S. Market Development Conference

PEARLITIC malleable was hailed as an answer to the question of how to expand the malleable casting market at the 6th Market Development Conference of the Malleable Founders' Society. Meeting at the Edgewater Beach Hotel, Chicago, April 7 and 8, some 100 malleable Foundry executives and sales personnel participated in a series of four sessions entitled "Expanding Our Market," "Knowing Our Competition," "Getting the Order," and "Some Impressions of the Foundry Industry." T. A. Scanlan, Eastern Malleable Iron Co., Newburgh, N. Y., presided throughout the conference.

Think and Use Castings

One of our objectives is to get designers and users of metal parts to think of castings instead of non-cast components, C. E. Brust, Eastern Malleable Iron Co., president of the Malleable Founders' Society, said in reviewing the organizations' promotional and developmental program. Outlining the M.F.S. program of research, handbook revision, and advertising, he went on to emphasize that the purpose of the conference was to devise ways and means of expanding markets. He suggested that pearlitic malleable be recommended for use wherever it meets service requirements.

Malleable iron has constantly improved over the years and salesmen today have a far better product to sell than a generation ago, C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis., said in his talk *"The State of Our Market."* He pointed out that the customer judges the entire company on the basis of the impression made by the salesman, in stressing the salesman's role in creating customer confidence.

Mr. Anderson predicted an output of some 950,000 tons of malleable during 1955. Noting an increasing proportion of malleable output going into the automotive industry (now over two-thirds), he urged that markets be found in other industries. The industry needs more technical graduates, he said, in expressing satisfaction that more and more are entering foundries.

Emphasizing the growing interest in pearlitic malleable, R. V. Osborne, Lakeside Malleable Castings Co., Racine, Wis., stated that while malleable tonnage as a whole has gone up about 25 per cent during the past seven years, the proportion of that tonnage produced in pearlitic has almost tripled. His company has been making pearlitic since the early 1920's, he said. Pearlitic is good for the small shop he said in his talk, *"Pearlitic Malleable for the Small Producer,"* because its properties enable it to compete with a number of other materials and processes.

Primary reasons for Lakeside's customers adopting pearlitic, Mr. Osborne said, were its wear resistance and low cost. In addition, among examples of conversions he mentioned, customers selected pearlitic for fatigue strength and better machinability.

Three factors in the selection of materials by a manufacturer are cost, design, and processing according to R. H. Marshall, Frank G. Hough Co., Libertyville, Ill. He gave ranges of per-pound costs of various castings and weldments, pointing out that materials used in his company's products represent a compromise between cost and ductility required. Fit is extremely important in a manufacturing operation, he said, in discussing tolerances.

Lists Castings Advantages

Mr. Marshall gave as advantages of castings their freedom from notches and residual stress, their convenience of metal placement, especially with complicated configurations, and the fact that they can be alloyed and heat treated. Machine designs can't be frozen for a number of years as they have in the past. The designer needs components that lend themselves to easy redesign, he said. He suggested that more sales contacts be made with engineers in order to encourage wider usage of castings.

Conference attendants viewed the sound-color motion picture *"Die Casting"* of the American Zinc Institute, and held a discussion of nodular iron.

Breaking up into groups, conferees discussed and subsequently reported in a general session on the following sales appeals of malleable iron: vibration damping qualities, toughness and ductility, ease and economy of machining, strength, impact resistance, casting close to finished form, rust and corrosion resistance, and design simplicity and appearance.

Speaking on *"What Are We Afraid Of?"* at the conference dinner, Will A. Foster, Borden Cheese Co., New York, said most of our problems are man-made and can be solved by man. He advised his listeners to be conservative optimists about the future and recommended that they sell "quality." Don't buck a trend—adjust your operations to it, he stated. Look for the preventive angle in developing new products, he said, pointing out that the product that prevents will always replace the product that cures.

Need Creative Selling

The day of the order taker is long past; the market requires creative selling, declared Frederick W. Dow, Dow Chemical Co., Midland, Mich., lead-off speaker at the *"Getting the Order"* session the second day. The creative salesman measures the customers needs and views the situation through the customer's eyes, thus making it easier for the customer to buy, Mr. Dow said. Poor planning and poor organization of time and effort are major causes of failure among salesmen, he declared. They must determine where to put their sales effort and plan their calls so as to make the most of their time with the customer.

A salesman has four goals according to Dow: (1) keep present business; (2) grow with the customer and get additional business as the customer expands; (3) get a greater share of the business; and (4) develop new business. Salesmen should sell the benefit of the product, not its specifications, he said. Other advice included: Have something to offer on a call—don't just drop in on a customer because you're in the area. Develop the confidence of the buyer. Follow a call with a letter reviewing the discussion. Sell in depth, don't concentrate on a single man in the plant. Entertain judiciously

and with tact. Provide service, and keep the purchasing agent informed on what is occurring in the trade.

Careful selection of salesmen results in less turnover, training, and supervision, the speaker said. Other benefits include more volume per man, more profit per man, and better morale, he stated. Qualities to look for in selecting salesmen given by Dow are: ability to think, emotional stability, insight into himself and others, and leadership. He pointed out that a good technical man can get the confidence of plant personnel as well as of the purchasing agent.

In discussing sales training, Dow said salesmen should know the product and the company, and should develop habits of action with constant emphasis on exercise of judgment. He recommended role playing with various members of the sales force playing the parts of individuals in case histories of sales taken from the files. Those not playing parts look on and criticize what is done.

C. H. Ker, Dalton Foundries, Inc., Warsaw, Ind., spoke on *"Are We Selling a Service?"* If malleable castings are being "bought" instead of "sold," he said, management must share some of the responsibility along with the salesman. He urged the selling of castings as components, not as bulk commodities.

Conversions offer a way of enlarging business, Roger Griswold, Erie Malleable Iron Co., Erie, Pa., stated in leading a discussion entitled *"Conversions, the Lifeblood of Our Industry."* Finding conversions is the major problem, he said, indicating that foundries are well informed on how to make conversions.

Robert Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., described the conversion of weldments to castings in which sample castings were stress-analyzed with brittle lacquer and strain gauges. In one example, cost was reduced 10 per cent and weight was reduced 20 per cent. In a second case, a simple design change resulted in an increase in load carrying capacity of 250 per cent.

Ben L. Detterman, Dalton Foundries, Inc., Warsaw, Ind., discussed a conversion resulting in a cost reduction of 29 per cent. He advised going through the customer's shop once a month with the shop superintendent in search of possible conversions.

Going through a customer's plant, D. F. Rupert, Erie Malleable Iron Co., Erie, Pa., said, he saw some rolled steel blanks and asked what they were for. Told they were for sheaves, he sold the customer on a conversion that cut costs to 40 per cent of the previous figure.

Ray Witt, Cadillac Malleable Iron Co., Cadillac, Mich., described the redesign as a malleable casting of a swivel-chair part that previously broke periodically. This led to a study of other chair components, he stated, with the result that another casting was developed to replace the first casting and a stamping at a saving of 33 per cent. Other conversions were described by Cal C. Chambers, Jr., Texas Foundries, Inc., Lufkin, Texas, E. K. Simonson, Belle City Malleable Iron Co., Racine, Wis., and Thomas Kirby, Northern Malleable Iron Co., St. Paul, Minn., and Donald Kilpatrick, National Malleable & Steel Castings Co., Cicero, Ill.

Methods of finding conversions developed by the discussion include: (1) look at equipment in use and on display at industrial exhibitions and in producers' show rooms; (2) follow tips from friends; (3) inquiries resulting from advertising; (4) periodic visits to manufacturers' shops; and (5) catch components on the drawing board and help design them as castings instead of having to convert them later after jigs, fixtures, and production procedures have been established.

In giving a customer's view of the industry, Thomas Logan, Caterpillar Tractor Co., Peoria, Ill., said that his company was influenced to buy malleable castings because of the following characteristics: castability, machinability, surface hardenability, ductility, finish, high ratio of yield to tensile strength, high ductility at high strength, and freedom from stresses due to the annealing inherent in the malleablizing process.

Following a showing of the sound film *"How to Sell Quality"* of the Dartnell Corp., Chicago, Glenn W. Merrefield, Giffels & Vallet Inc., Detroit, looked ahead to 1975 when he said the gross national product would be up from $365 billion to $585 billion. The labor force will not grow in the same proportion as population, requiring productivity to grow at a greater rate than during the past 25 years.

Expanded research facilities will result in new products and new industries not even thought of now, Mr. Merrefield said. He predicted an increase in casting demand of greater than 50 per cent over today's production.

Conference discussions ended with a round-up by Lowell D. Ryan, M.F.S. managing director, and J. H. Lansing, technical and research director. At the dinner concluding the conference, entertainment was provided by the Belle City Malleable Iron Co. male glee club.

Calendar of Future Meetings and Exhibits

May

6. . American Association of Spectrographers
Chicago. Sixth Annual Conference.

10-12 . . Metal Powder Association
Bellevue-Stratford Hotel, Philadelphia. Metal Powder Show and 11th Annual Meeting.

16-18 . . Industrial Heating Equipment Association
The Homestead, Hot Springs, Va. Spring Meeting.

20-21 . . Non-Ferrous Founders' Society
Congress Hotel, Chicago. Twelfth Annual Meeting.

22-26 . . Air Pollution Control Association
Detroit. Forty-eighth Annual Meeting.

23-25 . . American Society for Quality Control
Statler and New Yorker Hotels, New York. Ninth Annual Convention.

23-25 . . American Management Association
Roosevelt Hotel, New York. General Management Conference.

23-27 . . American Foundrymen's Society
Houston, Texas. 59th Annual Convention. Non-Exhibit.

June

8-10 . . American Welding Society
Municipal Auditorium, Kansas City. Third Annual Welding Show.

15-17 . . American Society of Training Directors
Ambassador Hotel, Los Angeles. Annual Convention.

16-17 . . American Foundrymen's Society
Morrison Hotel, Chicago. Chapter Officers' Conference.

16-18 . . Malleable Founders' Society
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

20-26 . . International Foundry Congress
London, England. Host: The Institute of British Foundrymen.

26-28 . . Alloy Casting Institute
The Homestead, Hot Springs, Va. Annual Meeting.

26-July 1 . . American Society for Testing Materials
Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. Annual Meeting.

September

12-16 . . Instrument Society of America
Shrine Exposition Hall, Los Angeles. 10th Annual Conference and Exhibit.

29-30 . . Missouri Valley Regional Conference
Missouri School of Mines, Rolla.

October

6-7 . . National Foundry Association
Edgewater Beach Hotel, Chicago. Fifty-seventh Annual Meeting.

13-15 . . Foundry Equipment Manufacturers Association
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

16-18 . . Conveyor Equipment Manufacturers Association
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

17-21 . . American Society for Metals
Convention Hall, Philadelphia. National Exposition and Congress.

19-21 . . Gray Iron Founders' Society
Hotel Schroeder, Milwaukee. Twenty-seventh Annual Meeting.

24-25 . . Steel Founders' Society of America
The Greenbrier, White Sulphur Springs, West Virginia. Fall Meeting.

E. C. Hoenicke

J. H. Smith

Discuss Sales Engineering

AT Annual F.E.F. Conference

HERBERT F. SCOBIE / *Editor*

SALES AND MARKET aspects of engineering education in cast metals, and the announcement that the University of Illinois (both downstate and Chicago) and the University of California (Berkeley) had been added to the roster of F.E.F. schools, highlighted the annual College-Industry Conference of the Foundry Educational Foundation in Cleveland, March 9 and 10, at the Hotel Cleveland. During the two-day meeting, which included the organization's annual business meeting, foundrymen and educators had an opportunity to become better acquainted with each other's problems.

Elections and trustee appointments for the coming year were announced with E. C. Hoenicke, Foundry Div., Eaton Mfg. Co., Detroit, being named president. He has been vice-president the past year. New vice-president is James H. Smith, Central Foundry Div., General Motors Corp., Saginaw, Mich. E. M. Knapp, Ferro Machine & Foundry, Inc., Cleveland, was re-elected secretary-treasurer.

In his welcoming address, F.E.F. President Thomas Kaveny, Jr., Herman Pneumatic Machine Co., pointed out that a common aim of Foundation members was to improve foundry education in colleges. Mr. Hoenicke presided at the opening session and throughout the day.

Keynote Speaker James H. Smith declared in his talk, *"Molding Your Future,"* that at no time did the foundry industry show as much promise as it does today. Customer satisfaction is vital to growth and expansion of any industry, he stated, pointing out that his customers will favor castings over forgings, stampings, and weldments provided they can be produced to meet service and mechanical specifications at a competitive price.

F.E.F. schools are an important source of foundry management for tomorrow, Smith said, but indicated he felt there was room for improvement in student attitude and guidance. Students must have the right attitude toward work and toward people, looking on work as a challenge. They must recognize the rights of others while working with them as a team. To the students present, he urged making the most of their time and asked them to keep in mind that the 40-hr week was not designed for ambitious men.

In a series of brief presentations of educational "shop talk," seven F.E.F. professors described their approaches to foundry education and told how they carry on some of their work. Austen J. Smith, Michigan State College, cited the complexity of modern foundry operations which require a background in both metallurgy and materials handling. Greater emphasis on general educational subjects results in more and more encroachment on technical courses, he pointed out.

Clyde M. Adams, Jr., Massachusetts Institute of Technology, said teaching and research are not incompatible. He explained that contract research provides practical thesis problems for upperclassmen and graduates, giving them a background beyond the strictly educational aspects that makes them more useful to industry. Such research, he asserted, builds both laboratory facilities and laboratory staff.

J. F. Wallace, Case Institute of Technology, stated that he preferred the fundamental to the mechanical approach. Engineers must be able to direct not only today's but the future course of foundry technology, and they cannot do this if concerned primarily with mechanical details, he said.

Other educators who spoke were H. A. Montgomery, Purdue University, D. C. Williams, Ohio State University, L. F. Mondolfo, Illinois Institute of Technology, and D. C. Ekey, Pennsylvania State University.

Reporting at the annual meeting, E. M. Knapp stated in his report as secretary-treasurer that 41 new members had been added during the past year, making the total 360.

In his presidential report, Thomas Kaveny, Jr., who presided during the annual meeting, reviewed the extensive visits by Foundation staff and officers in 46 foundry centers during the past year. Objective, he said, was to report to members and to acquaint non-members with F.E.F. Placement for graduates and summer school students was running high, he indicated, with demand exceeding the supply. During the past year F.E.F. schools had increased the value of their laboratory facilities by $86,000, he stated. Scholarships awarded the first semester number 149, and in the second semester were 156.

As chairman of the Nominating Committee, Stowell C. Wasson, National Malleable & Steel Castings Co., Cleveland, reported the following nominations: president, Mr. Hoenicke; vice-president, Mr. James H. Smith; secretary-treasurer, Mr. Knapp.

Named trustees-at-large for three-year terms were: W. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.; H. A. Forsberg, Continental Foundry & Machine Co., East Chicago, Ind.; E. R. Oeschger, General Electric Co., Schenectady, N. Y.; Earl Paltenghi, H. C. Macauley Foundry Co., Oakland, Calif.; and L. P. Robinson, Foundry Div., Archer-Daniels-Midland Co., Cleveland.

Trustees representing founding members of F.E.F. were announced as: American Foundrymen's Society—L. H. Durdin, Dixie Bronze Co., Birmingham, Ala.;

continued on page 148

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Foundry Trade NEWS

Cameron & Barkley Co. has been appointed authorized distributors for Cooper Alloy Corp. The ninety-year-old mill supply firm will be working very closely with James W. Jones of Montezuma, Ga., Cooper Alloy's representative in the territory.

R. H. Wittbold Co., Houston, Texas, has been appointed exclusive representative for Wheelco Instruments Div., Barber-Colman Co. in the Houston area, and Swieco, Inc., Forth Worth, Tex., has been appointed the exclusive representative for Wheelco in the Fort Worth area.

Fire Brick Service & Supply Co., Cleveland, Ohio, changed its name to A. P. Green Fire Brick Company of Ohio.

Chain Belt Co., Milwaukee, Wis., has purchased forty-seven acres near Downers Grove, Ill., for the purpose of expanding its Shafer Bearing Division manufacturing facilities. This new property acquisition will enable Chain Belt Co. to increase its Shafer Bearing Div. manufacturing capacity and improve service to customers in both the domestic and foreign markets.

Miller Equipment Co. has been appointed as dealer in Western Michigan for **Hyster Co.** The extensive Hyster line of lift trucks, straddle trucks, mobile cranes and platform trucks will be available through their offices located at 538 Bond Ave., N. W., Grand Rapids 2, Mich.

Duraloy Company, Scottdale, Pa., has issued a new general 16-page bulletin (No. 3354-G) which describes in detail its facilities for producing high alloy static and centrifugal castings used for resisting high temperatures, corrosion and abrasion.

International Nickel Co., Inc., has just published a booklet entitled *"Ductile Iron —The Cast Iron That Can Be Bent."* This 30-page booklet, illustrated with more than 40 photos, includes case histories, specification tables for the seven main types of ductile irons and charts comparing mechanical properties.

The Detroit Electric Furnace Div. of **Kuhlman Electric Co.,** Bay City, Mich., recently expanded their sales division with the following appointments: **Brumley-Donaldson Co.,** Oakland, Cal., was appointed sales representative for the northern half of the state of California, and **C. W. Lueders, Jr.,** Riverton, N. J., was appointed sales agent for eastern Pennsylvania, southern New Jersey and Maryland.

Cooper Alloy Corp. has announced a special educational scholarship fund which will send two high school graduates, whose parents are employed by Cooper Alloy Corp., to the college of their choice. Each scholarship will have a total value of $2000 and may be applied toward tuition and books at any college or university approved by the Middle States Association of Colleges or other acceptable educational accrediting body.

Meehanite Metal Corp., New Rochelle, N. Y., announced that a contract to manufacture Meehanite castings has been entered into with the **Nordberg Manufacturing Co.** The company will produce Meehanite castings in both its foundries in Milwaukee and St. Louis.

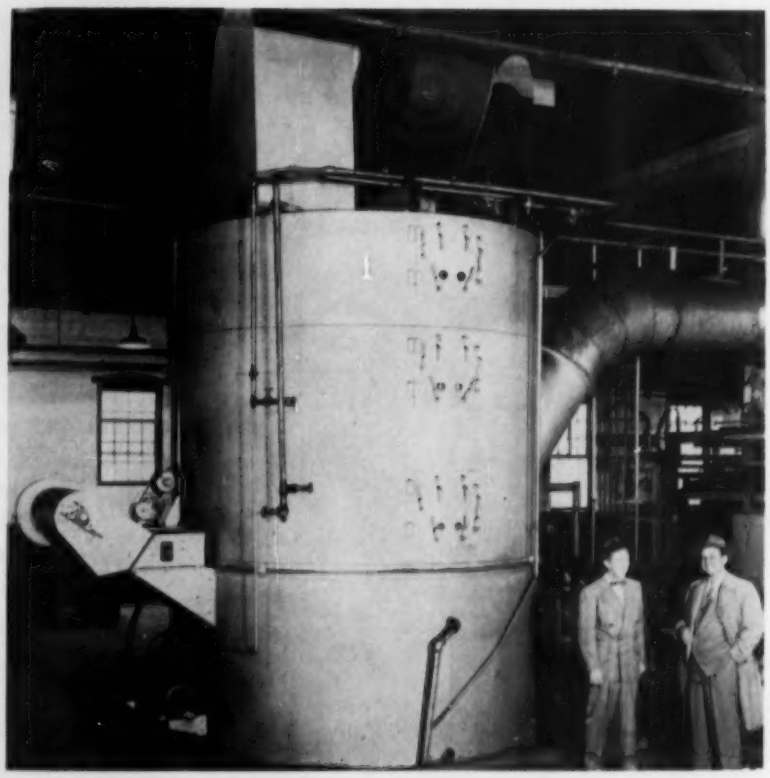
Excavation has started on a new $300,000 engineering building at **Cleveland Crane & Engineering Co.,** Wickliffe, Ohio. It will be a 128 x 71 ft brick building with a second floor section at rear measuring 25 x 138 ft. Hallways connecting with the present main office building will be provided.

C. W. Schwenn, formerly vice-president and director of manufacturing of Brillion Iron Works, Inc., has purchased the **Waupaca Foundry, Inc.,** Waupaca, Wis. Donald Brunner, a graduate mechanical engineer from Marquette University has resigned as superintendent of the coreroom and shell molding at Brillion Iron Works, Inc., and will be vice-president and superintendent of Waupaca Foundry. Waupaca Foundry will specialize in quality high-test gray iron castings and will at an early date also go into production of shell molded castings.

Norton Company's Los Angeles District Office has moved to 5905 Pacific Boulevard, Huntington Park, California, Logan 5-8195.

F. J. Stokes Machine Co., Philadelphia, Pa., has opened a new New York district sales office at 26 East 1st St., Mount Vernon, N. Y. Another branch office is opening at 2165 Morris Avenue, Union, N. J., to serve the new concentration of industrial firms in Northern New Jersey.

Form National Dust Collector Corporation



National Dust Collector Corp. has been formed to engineer and market a high-efficiency dust collector, according to Bruce L. Simpson, president of the new company as well as National Engineering Co., both in Chicago. Contaminated air, at normal dust velocity, strikes water in the sludge settling basin upon entering the collector. Rising through an area of steady rain, air gives up the rest of contamination passing through many layers of glass spheres (on grating) whose surfaces are wetted by a continually replenished pool of water above. Drops of water from washed spheres carry impurities to the sludge tank for chain flight conveyor removal. Moisture in cleaned air is removed by multi-layer of dry spheres as the air passes through to exhaust.

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Education Meeting Is Held at Dobbins

Students of Dobbin's Technical-Vocational High School operating their school foundry for visiting foundrymen.

The Philadelphia Chapter held an education meeting in cooperation with the Murrell Dobbins Vocational-Technical School, at the school, March 11.

The evening meeting was so devised as to give industry the necessary insight into the secondary level training that is occurring in the Philadelphia area relative to the cast metals industry. The program was preceded by a banquet in the school, that was attended by some 150 persons, after which the group adjourned to the auditorium and a panel discussion covering "Training of Foundry Personnel" was presented.

B. A. Miller, Crown Non-Ferrous Foundry, Inc., Chester, Pa., acted as moderator. M. Lippincott, Florence Pipe Foundry & Machine Co., Florence, N. J., spoke on the type of individual needed within his organization and the plan of training that is given within his plant. It was brought out that in the case of each individual plant there is a specific type of in-plant training orientation that is necessary before a new employee is able to become productive in the eyes of the employer.

T. F. Miller, Schneider Bowman Co., Inc., Philadelphia, agreed with Mr. Lippincott, and pointed out that he operates an entirely different type of shop but finds that in each case he must offer the correct training in order that he benefit to the highest degree from each of his employees.

The third speaker was E. H. Briggs, Principal of the Dobbins Vocational-Technical School. He brought to the people the goals of a school training program. From an individual's point of view a graduate student, E. McNally, apprentice molder, Schneider Bowman Co., Inc., gave his viewpoints about some of the advantages he derived from a technical school training.

A. B. Sinnett, American Foundrymen's Society, outlined briefly the part that AFS is endeavoring to play in in-plant training programs and education programs at the secondary and technical vocational level. The Foundry Educational Foundation was represented by Charles Esgar, who outlined the F.E.F. activities at the college level. William Morley, Olney Foundry, Link-Belt Co., arranged the program.

Thousands Attend Twin City Career Festival

Several Thousand high school and college students in the Twin City area are better informed today about the cast-metal industry. The medium for this education was the Career Festival held March 8-10, at St. Thomas College in St. Paul. Representatives of major industries in the Twin City area took advantage of this vocational guidance conference to better acquaint students with career possibilities in their respective fields.

Through the efforts of the Twin City AFS Chapter, the foundry industry was well represented. Special efforts on the part of D. B. Fulton, Northern Malleable Iron Co., St. Paul, and his Educational Committee, as well as F. Holtby, Associate Professor of Mechanical engineering, University of Minnesota, and H. W. Teichroew, St. Paul Vocational High School, produced one of the most attractive booths in the show. A. B. Sinnett, educational director of the American Foundrymen's Society, came from AFS headquarters to lend his support to the chapter's efforts.

Members of the Twin City AFS Chapter interviewed three to four thousand students attending the chapter's exhibit, and distributed brochures and pamphlets describing foundry career possibilities.

The AFS exhibit occupied two adjoining booths. Representative castings, molds, cores and patterns were displayed to show the development of a casting. In addition, several items of eye-catching novelty interest were shown, along with typical examples of gray iron, steel and non-ferrous castings. During the hours the exhibits was open, students were in constant attendance at the booth, questioning the foundrymen on career possibilities for their own particular talents and asking for advice on future schooling needs. The response of the students was most gratifying.

Part of the staff which handled the Twin City booth at the Career Festival at St. Thomas College, St. Paul, left to right: H. W. Teichroew, St. Paul Vocational High School; H. J. Flaaten, Midwest Pattern Co.; F. Holtby, University of Minnesota, J. R. Entenmann and D. B. Fulton, Northern Malleable Iron Co., and Ashley B. Sinnett, educational director, AFS.

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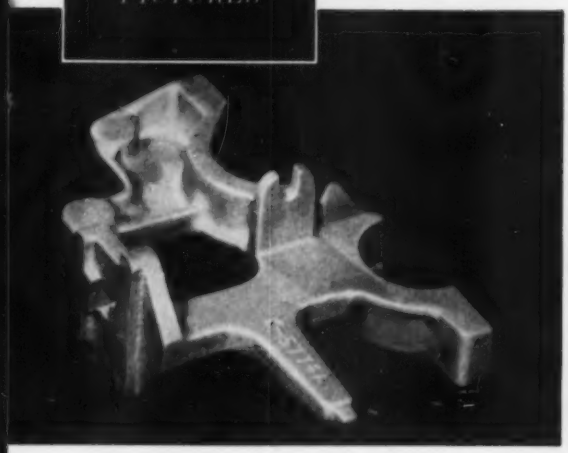

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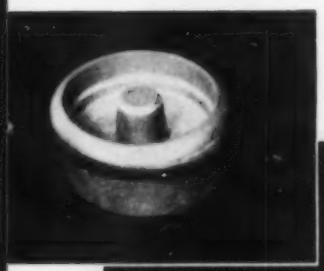

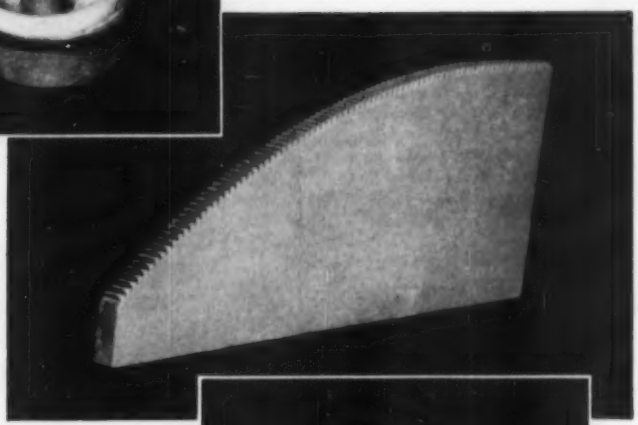

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F.E.F. Conference

continued from page 141

Gray Iron Founders' Society—R. R. Washburn, Plainville Casting Co., Plainville, Conn.; Foundry Equipment Manufacturers' Association—K. F. Lange, Link-Belt Co., Chicago; Malleable Founders' Society—T. T. Lloyd, Albion Malleable Iron Co., Albion, Mich.; Non-Ferrous Founders' Society—H. A. White, Smeeth-Harwood Co., Chicago; and Steel Founders' Society of America—R. P. Brewer, Symington-Gould Corp., Depew, N. Y.

E. J. Walsh continues an executive director of the Foundation, with H. Charles Eagar as assistant secretary.

T. Keith Glennan, president of Case Institute of Technology, spoke at the banquet following a reception for the new officers. M. J. Allen, American Steel Foundries, Chicago, presided. Dr. Glennan touched on the progress in metallurgy and foundry practice which have indicated the continued transition of the castings industry from an art toward a science. Looking ahead, he envisioned automation, nuclear power, and production of special high temperature and oxidation resisting materials. For the job ahead, educational institutions need sympathetic understanding of industry and financial support unrestricted as to end use, he said.

A panel discussion on *"Sales and Market Aspects of Engineering Education in Cast Metals"* followed reports of the University Advisory, the Technical Advisory, and the Industry Advisory Committees the second day. Panel members under the chairmanship of M. J. Allen were: T. T. Lloyd; Ross L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.; C. H. Ker, Dalton Foundries, Inc., Warsaw, Ind.; R. B. Parker, American Brake Shoe Co; and S. C. Wasson.

Historically, castings have been "bought" not "sold," Mr. Allen stated in initiating the panel discussion. The foundry industry has been production minded, not sales minded. He said the industry's two immediate needs are an aggressive castings sales program, and a customer education program.

In answering questions, the panel pointed out the following three advantages of an engineering background in technical sales work: (1) complex product technology; (2) more analytical and statistical approach to market evaluation and the analysis of customer's needs; and (3) complex technology in customer's uses of castings. In general, it was agreed, the specific engineering degree of the salesman is not important. Engineering training would preferably be supplemented by courses in management, cost accounting, public speaking, and English.

Characteristics of a good salesman, the panel said, would include good scholastic standing, a warm, pleasant, sincere personality, and ability to serve and to cooperate. Others include demonstrated performance of leadership in organization work, enthusiasm for keen competition, and over-all personal characteristics such as neatness, good manners and conversational ability, and good voice.

In a talk entitled *"Properly Engineered Castings,"* W. G. Ferrell cited the sales advantages of castings and told how an aggressive sales and engineering program can result in parts not now cast being converted to castings.

Former F.E.F. scholarship holders commented on their experiences and progress since entering the castings industry. Speakers were A. W. Bardeen, Ohio Brass Co., Mansfield, Ohio, and R. H. Dobbins, Albion Malleable Iron Co., Albion, Mich.

In reviewing Foundation activities during the eight years since it was founded, E. C. Hoenicke pointed out that an adequate manpower pool was an objective which was being sought through improvement of foundry education in engineering colleges and encouragement and assistance of students in pursuit of foundry studies. Other objectives include spreading knowledge and appreciation of cast metals.

Recognition of these objectives by the castings industry is not enough, he stated, indicating that foundries should realize that engineering talent is not a luxury but a necessity. He urged foundrymen who feel an engineer is not important to them today to consider what their problems may be in the future, and to evaluate the ability of existing staff to handle them.

Conference summary and recommendations for future consideration were made by E. R. Shorey, University of Wisconsin.

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Western Speaker Suggests Duplexing Nodular Iron

Three papers covering nodular iron, shell molding, and investment castings were presented March 28 during the Western Metals Congress in Los Angeles. *"Ductile Iron and Its Application"* was presented by Morris Asimow, Asimow Engineering Co., North Hollywood. Walter H. Dunn, Pacific Alloy Engineering Corp., San Diego, spoke on *"What Shell Molding Offers to the Producer and the User of Castings."* James B. Price, Jr., Arwood Precision Casting Corp., Los Angeles, presented *"An Engineering Appraisal of the Investment Casting Process."*

S. L. Jackson, Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp., Los Angeles, presided at the session; W. W. Stephens, Stanley Foundries, Los Angeles, was co-chairman.

Mr. Asimow explained that the internal notch effect of normal gray iron was eliminated by making the graphite spheroidal. In addition, other constituents that would markedly reduce ductility, even with spheroidized graphite, are minimized. Thus, he said, in making ductile iron, low phosphorous is desired to avoid steadite. Low sulphur—0.04 per cent, better 0.02—is desired to minimize magnesium sulphide formation which reduces the amount of effective magnesium available for spheroidization. Low tramp element content in the metal is essential to minimize carbide formation, magnesium consumption, formation of ductility-reducing solid solution with iron, and to avoid reduced tendency to spheroidize.

Mr. Dunn stated that shell molding would not revolutionize the castings industry nor replace green sand, but that it did provide a way to make a better mold, faster. He listed as advantages to the foundryman: cleaner operation; easier because of reduced materials handling; no flasks needed; molds are durable and not affected by moisture or storage; mechanization is easy and cheap; lower pouring temperature can be used; and high mold collapsibility.

Disadvantages include high initial casting cost, expensive patterns, and high pattern maintenance cost, Dunn said. Shell mold castings users gain from improved finish, better mechanical properties, improved accuracy, thinner walls that are possible, smaller holes that can be cored, and machining that can be saved. Disadvantages to users include the fact that there are no specifications for shell molds, and that castings are limited at present to comparatively small sizes. He indicated that his company was building a machine for a 48 x 72-in. shell. He used a zircon sand because of high pouring temperatures desired and avoided gates, merely pouring the metal directly into the riser, he said.

Mr. Price said all types of alloys can be cast in investment molds. He declared that investment castings should be considered whenever the shape or the alloy doesn't lend itself to economical machining.

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CENTRAL ILLINOIS . . W. A. Hambley, Charles A. Krause Milling Co., guest speaker, center, with Bruce Norman, Black Products Co., left, and C. J. Turner, Caterpillar Tractor Co., right, discussing the AFS ANALYSIS OF CASTING DEFECTS at the March meeting.

Chapter News

Central Ohio

Cyril Braun, treasurer for the Central Ohio chapter has resigned due to his being transferred to Chicago. The chapter has elected Thomas M. Cusack, Oliver Corp., Springfield, to replace Mr. Braun.—*K. G. Presser.*

Mid-South

The February meeting was held at the Rebel Motel in Memphis. Guest speaker was Clyde A. Sanders, American Colloid Co., Chicago, who spoke on the proper sand control in the foundry. Mr. Sanders emphasized the importance of a proper sand mix and showed slides portraying various casting defects resulting from improper sand control. He stated that while improper gating and risering may cause scabs, tears, blows and various other defects in castings, in most instances they will not appear if we have sand of the highest quality.—*Raymond C. Morin.*

Corn Belt

"Pressure Molding" was the subject of W. L. Adams, Eastern Clay Products Co., Chicago, at the March meeting held at Cantoni's Grill, Omaha, Neb. Verne Holmes, Paxton-Mitchell Co., presided and 24 members attended.

Mr. Adams spoke on the use of the diaphragm molding machine, the uniformity with which the machine squeezes and the noticeable improvement to casting quality. He said that the sand used in this type of molding can go to as low as 2.0 per cent moisture without causing any harm to the structure of the mold. A relationship of shape, pressure and sand moldability is the way to produce good castings. The use of different size jobs on the machine and the use of different types of flasks and how they will stand up under pressure of the machine, were discussed. Mr. Adams stated that by the use of the rubber diaphragm used to squeeze the mold uniformity will not damage the flask shape.—*Eugene Hagedorn.*

Central Indiana

The March meeting was held at the Athenaeum Turner's Club and was attended by approximately 150 members and guests. H. E. Patty, Atlas Foundry Co., technical chairman for the evening, introduced the guest speaker, H. F. Bishop, Naval Research Laboratory, Washington, D. C., who's subject was *"Gating and Risering."*

Using colored slides, Mr. Bishop discussed the mechanics of solidification, explaining why it is more difficult to feed a bar than a plate. He also discussed the reasons why it is more difficult to riser and feed a low carbon iron than high carbon iron. He explained the use of chills between risers to cut down feeding distance and finally discussed the methods and results of degassing non-ferrous metals in a vacuum.

A short movie, produced by General Refractories, Philadelphia, entitled, *"The Manufacture of Refractories,"* was shown after the meeting.—*Charles R. Jones.*

Michiana

The March meeting was held at the Oliver Hotel, South Bend, Ind. Chairman R. A. Payne, Sterling Brass Foundry, Elkhart, Ind., opened the meeting and speakers were introduced by Fred Davis, Oliver Corp., South Bend. Howard Voorhees, chairman of the nominating committee, reported the slate of officers and directors to be voted on. The group then separated into ferrous and non-ferrous meetings.

F. James McDonald, Central Foundry Div., G.M.C., Saginaw, Mich., spoke on *"Gating and its Effect on Castings,"* at the ferrous meeting. He told of the extensive research in gating carried on at Saginaw Malleable. Tests were conducted on the shape and size of sprue cup, diameter and length of down sprue, area of runners, and height of pouring ladle above mold. Slides were used to illustrate the talk.

At the non-ferrous meeting, John G. Kura, Battelle Memorial Institute, Columbus, Ohio, spoke on *"Titanium, the Wonder Metal."* Slides as well as castings and raw materials were used in the talk. —*F. J. Crowley.*

Timberline

R. H. Groman, Eutectic Welding Alloys Corp., Moline, Ill., spoke on *"New Development in Foundry Welding"* at the March meeting held at Hotel Oxford, Denver, Colo.

Slides illustrated his talk on low temperature welding and brazing. With the new developments in foundry welding it is now possible to make welds of ductile iron, gray iron and non-ferrous metals formerly impossible, he said. On the theory that liquids dissolve solids it is possible to use rods with low melting points, which greatly reduce the melting points of the metal to be welded. In arc welding, new coatings have been developed for better protection and reduced amperage and cast iron may be welded without hard spots. The welding manuals of tomorrow will provide much more in the way of information and at the same time the welder will have to know more about the characteristics of metals to be welded, he concluded. —*A. D. Neal.*

Mo-Kan

The March meeting of the Mo-Kan Chapter was held at the Fairfax Airport, Kansas City, Kan. Guest speaker was George Scherer, Cramer Posture Chair Co., and his subject was *"Permanent Molding of Aluminum Castings."* Mr. Scherer is a local speaker and a member of the chapter.

Lloyd Canfield, Canfield Foundry Supplies & Equipment, Kansas City, chairman, announced a change in the date of the Missouri Valley Regional Conference at Rolla, Mo., from October 20-21, 1955, to September 29-30, 1955.—*Howard Julian.*

Quad-City

At the March meeting the chapter was treated to an unexpected preview and in-

vitation by L. E. Wass, Davenport Iowa Vocational School, in regard to the April meeting. This meeting will be held in conjunction with the annual Davenport Vocational Dinner.

Technical chairman F. T. McGuire, Deere & Co., Moline, Ill., then introduced the speaker, D. R. Forrest, Cleveland Cliffs Iron Co., at the Annual Boss Night. Mr. Forrest's talk, *"America's Iron Future,"* centered about estimates of iron ore production in the future and the sources of these ores.

The speaker pointed out that recent reports of complete depletion of high grade Superior ores were in error, however, the tonnages shipped from that area would gradually be supplemented by other ores. Much emphasis was placed on present progress in the development of low grade Superior ores. The successful development of these ores would relieve ore shortages in case of an emergency in the future. The low grade taconites and jaspers are now being beneficiated, resulting in many shipments of high iron, low silica and phosphorus concentrates. The annual production of these ores is expected to reach 40 million tons by 1980. By this date total national iron ore demands are expected to equal 184 million tons compared with 125 million tons in 1953. The largest source of ore will be foreign, 72 million tons, with the balance supplied by Superior high grade iron ores and others.

It was of interest to note that 25 per cent of the world's 315 billion ton reserve is in North America. Only 7 per cent of the present known reserves are in Communist held countries.

Mr. McGuire concluded the evening with a commendation to the iron ore industry in their billion dollar investment in the development of low grade ores.—*G. F. Thomas.*

British Columbia

The March meeting was held in Vancouver at Letson & Burpee, Ltd's. foundry and was attended by 110 members and guests. Speaker for the evening was Larry Teeple, Shalco Engineering Co., Palo Alto, Calif.

A brief and instructive discussion of the various sand and resin mixtures as applied to the manufacturing of shells, was held and followed by a practical demonstration of a shell molding machine and shell core blower in operation. The machines were kept in operation so that every individual attending could observe every aspect of the procedure, and personally question Mr. Teeple on any phase.

The Nominating Committee submitted to the membership, appointments to vacated positions.—*T. H. Hornby.*

Washington

Officers and directors elected at the March meeting for the 1955-1956 term were: *Chairman,* W. A. Shaug, South Seattle Steel Foundry Co., Seattle; *Vice-Chairman,* H. R. Wolfer, Puget Sound Naval Shipyard, Bremerton; and *Program Chairman,* W. K. Gibb, Atlas Foundry & Machine Co., Tacoma.

Directors elected for 1955-1958 terms were: V. W. Rowe, Ballard Pattern & Brass Foundry; D. Coccione, Washington

FRED RIDENOUR, WHITING CORP.

CHICAGO . . At the March meeting, from left to right: R. L. Doolman, Miller & Co., chapter president B. L. Simpson, National Engineering Co., national president elect; J. T. Moore, Wells Mfg. Co., chapter vice-president; and C. V. Nass, Beardsley & Piper, national director.

NORTHEASTERN OHIO . . Talking things over after the March meeting, from left to right: Dave Clark, Forest City Foundries Co.; guest speaker B. C. Yearley, National Malleable & Steel Castings Co., and AFS National President Frank J. Dost, Sterling Foundry Co.

HOWARD BODWELL, GENERAL ELECTRIC CO.

CENTRAL NEW YORK . . W. D. Dunn, Oberdorfer Foundries, Inc., left, discussing a core problem with N. W. Meloon, Jr., Meloon Bronze Foundry, Inc., at the March meeting. In the background Lloyd Wright, U. S. Radiator Corp., left, is receiving some good foundry methods advice from N. Harold Boardman, General Electric Co.

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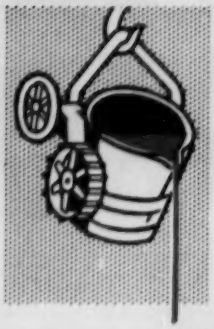

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TRI-STATE . . O. C. Bueg, Shell Castings, Inc., guest speaker, left, reviewing the March meeting with chapter chairman Willis Mook, Bethlehem Supply Co.

Iron Works; and F. R. Young, E. A. Wilcox Co., all of Seattle.

Guest speaker for the meeting was Donald L. LaVelle, Federated Metals Div., American Smelting & Refining Co., Barber, N. J., who spoke on *"Making Better Aluminum Castings."* Prior to Mr. LaVelle's talk, E. D. Boyle, Boyle Foundry Service Co., Seattle, presented an interesting display of hardening cores by using CO_2.

Mr. Boyle in his display of hardening cores made some cores which consisted of new silica sand mixed with approximately 6 per cent sodium silicate and mulled. The cores were then removed from the corebox onto a regular core plate and sprayed with a fire extinguisher containing CO_2. The carbon dioxide reacts with the sodium silicate and immediately hardens the core so it can be handled and used at once. Mr. Boyle also explained that it can be successfully used for ladle linings.

Mr. LaVelle discussed six casting defects commonly associated in the production of aluminum castings and had many slides to illustrate the different defects. These six defects included three types of inclusions, pin holes, shrinks, rat tails and cracked castings due to heat-treatment.— *William K. Gibb.*

Eastern Canada

The March meeting took the form of a panel discussion on *"Dimensional Tolerances and Variations in Castings."* W. Turney Shute, Steel Div., Canadian Car & Foundry Co., Montreal, acted as technical chairman. The panel was comprised of the following: A. E. Wells, Dominion Engineering Works, Ltd., Lachine, Que., representing pattern makers; Gilles Lefebvre, Superheater Co., Ltd., Sherbrooke, Que., representing foundrymen; J. T. Gilman, Canada Iron Foundries, Ltd., Montreal, representing inspectors, and Don Hurrel, Canadian Allis-Chalmers, Ltd., Lachine, representing the consumer.

Mr. Wells pointed out that the pattern maker's needs in controlling casting tolerances include: careful work, a sense of design which enables him to balance molding requirements against the engineer's desires, and 40 years experience to enable him to grope a little less blindly in the maze of problems created by that phenomena we call "shrinkage."

Mr. Lefebvre mentioned that the molder

NORMAN E. HALL, ELECTRIC STEEL FOUNDRY

OREGON . . Robert E. McGuire, left, Asst. Technical Librarian, Multnomah County Library Assn., accepts complete publication of AFS from Phillip Laugen, Oregon Steel Foundry Co., chapter chairman. Books were donated to public library by Oregon chapter as public service.

could only produce a casting as close as the pattern or pattern equipment that he has to use, but he felt that the firm that he worked with in iron castings that anything within the following tolerances would be acceptable: in small castings less than 6 in. plus or minus 1/32 in. tolerance; from 12 to 24 in. in length, plus or minus 1/16 in.; from 3 to 4 ft in length, anywhere from plus or minus 1/8 in. to 5/32 in. in length. But, as he outlined, after a short run of castings they were quite capable of cutting the above tolerances still finer with the cooperation of the pattern maker.

Mr. Gilman cited the main causes for rejection as: (1) Dimensional error, and this includes the old favorite, "not enough material to clean up," (2) Metallurgical errors, including improper thermal treatment, wrong material, too hard and too soft, (3) Foundry errors, such as castings not properly cleaned, shrinkage - holes, porosity, core holes off center, undesirable chills, warpage, cracks and blowholes, etc.

Mr. Hurrell stated that his aim at the meeting was to emphasize the consumer's requirements in the matter of dimensional accuracy of castings in general, and did not propose to tell any particular foundry what steps to take to achieve this accuracy. He said that his company would obviously like a perfectly sound casting correct to dimensions and with certain minimum physical properties, but they know that this is almost impossible so they usually specify a grade that can be produced with reasonable facility and where the physical properties, as represented by a test bar, come up to requirements.—*Wm. C. H. Dunn.*

Texas

The San Antonio Section meeting was held at Alamo Iron Works, March 21, and 55 members and guests were present. Harry W. Dietert, Harry W. Dietert Co., Detroit, gave an informative talk on sand and shell molding. Refreshments, following the meeting, were sponsored by W. H. Winterborne & Sons.

At the February meeting at the Alamo Iron Works, 43 members and guests were present to see a safety film, *"The Gambler."* An interesting talk on metals was given by Dr. Robert J. Anderson, head of the Metallurgy Dept., Southwest Institute of Inventive Research. Texaloy Foundry Co. sponsored the refreshments following the meeting.—*George H. Hartwell.*

Detroit

The February meeting dealt with casting defects. Moderator was Wm. Yay, Cadillac Motor Car Div., General Motors Corp. The four panelists were: G. Galmish, Michigan Malleable Iron Co.; M. Gittlen, Consumers Metal Corp.; Harry W. Dietert, Harry W. Dietert Co.; and Stanley Strnad, Cadillac Motor Car Div., G.M.C., all of Detroit.

Local foundrymen brought defective castings to the meeting for display and comments.—*Jess Toth.*

Birmingham

The March meeting was held in the Tutwiler Hotel, Birmingham, and 85 members and guests attended. A. J. Fruchtl, U. S. Pipe & Foundry Co., Birmingham, vice-chairman, presided. Coffee speaker was Aubrey C. Ross, assistant district director of the Internal Revenue Service, and he discussed some of the significant changes in the Revenue Code of 1954.

C. K. Donoho, chairman, Educational Steering Committee, detailed the forthcoming lecture series on advanced foundry practice. T. H. Benners, chairman, Nominating Committee, presented the nominations for officers for the 1955 term.

The technical portion of the meeting was given to the showing of a color film, *"Effect of Gating Design on Casting Quality."* This film was made as a result of an AFS sponsored research project investigating the flow of molten metal into a mold. Morris L. Hawkins, Stockham Valves and Fittings, Inc., lead the discussion on the film.—*J. A. Wickett.*

Central Michigan

Members and guests at the March meeting at the Hart Hotel, Battle Creek, Mich., heard Harry St. Johns, Crane Co., Chicago, speak on *"Brass and Bronze Foundry Practice."* Mr. St. John was introduced by Technical Chairman Kenneth Rhodes, Engineering Castings Co., Marshall, Mich. Because of Mr. St. Johns' excellent background in various fields of the foundry industry, he was able to give many helpful ideas and suggestions.—*L. Heisler.*

Northeastern Ohio

B. C. Yearley, National Malleable & Steel Castings Co., spoke on *"Casting Defects"* at the March meeting at Tudor Arms Hotel, Cleveland. He stated that mechanization of foundries is doing away with the old-time molder, who, through experience learned how to hand-make a mold to avoid many casting defects. The result is that responsibility for casting quality is pushed upon supervisory personnel. In the speaker's opinion, foundry foremen, depending upon their know - how, will make or break foundries in the next 10 years.

In a separate session after dinner, the patternmakers division of the chapter heard David Kindt, Kindt-Collins Co., Cleveland, speak on *"Research—What It*

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MICHIGAN STATE COLLEGE . . Guest speaker Dr. Frank Rote, Albion Malleable Iron Co., left, talking things over at the February meeting with student chapter chairman Claridon Thomas, center, and Edward Lahnala, student chapter member, right.

DETROIT . . Some of the members examining defective castings brought to the February meeting by local foundrymen for trouble-shooting session.

NOBLE YORK, INTERNATIONAL HARVESTER CO.

CENTRAL INDIANA . . Talking things over at the March meeting, from left to right: guest speaker H. F. Bishop, Naval Research Laboratory; James A. Barrett, National Malleable & Steel Castings Co.; and Dallas Lunsford, Perfect Circle Corp.

Means to Patternmaking." Mr. Kindt emphasized that the patternmaking industry is on the threshold of drastic change, particularly in the area of use of plastics, as a supplement to wood and metal, and pointed out the need for research on special plastics for pattern purposes. The problem is a great one, he said, and will require highly trained technical personnel, to make a systematic classification of materials. Questions of means of use and handling also will have to be explored.—*R. H. Herrmann and J. C. Miske.*

Tennessee

The chapter's first annual management night, with top officials of Chattanooga area foundries in attendance, was held at the March meeting. The meeting, with 60 members and guests in attendance, was held at the Hotel Patten, Chattanooga, Tenn. Charles S. Chisolm, Wheland Co., presided, and William B. Grieser, Ross Meehan Foundries, was technical chairman for the evening.

Guest speaker was Hans J. Heine, AFS technical director, and his subject was "*AFS Research—Your Foundry's Silent Partner.*" Many AFS research programs were reviewed by Mr. Heine.—*W. F. Hetzler.*

Michigan State College

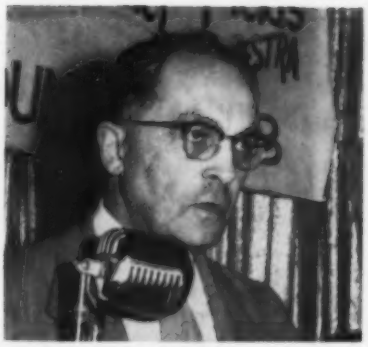
Dr. Frank Rote, Albion Malleable Iron Co., Albion, Mich., was guest speaker at the February meeting of the Michigan State College Student Chapter. Dr. Rote spoke on the general topic of "*Company Training Programs for Engineering Graduates,*" with special reference to the field of cast metals.

He advised 25 students to seek employment with companies that have broad training programs that are organized and guided by component engineers or other technically trained men. Dr. Rote stated that an engineering graduate in a good foundry training program would have an opportunity to learn the following: (1) Operations in all important foundry departments, (2) Equipment design and maintenance problems in each area and (3) Supervisory personnel and their many problems.—*C. C. Sigerfoos.*

Oregon

Forty five members heard Donald L. LaVelle, Federated Metals Div., American Smelting & Refining Co., Barber, N. J. discuss correction of defects in castings in his talk, "*Making Better Aluminum Castings,*" at the Columbia Athletic Club, Portland, March 23. Mr. LaVelle used slides, sample castings and blackboard illustrations in pointing out problems involved in melting, degassing, pouring and gating and risering of aluminum castings. His invitation to members to interrupt at any time resulted in lively discussions.

The Oregon Chapter presented the complete set of American Foundrymen's Society's publications as a gift to the Multnomal County Library Association. Robert E. McGuire, assistant technical librarian, accepted on behalf of the Library Association.



ST. LOUIS . . Guy A. Pealer, General Electric Co., speaking at the March meeting.

J. T. Dorigan, Electric Steel Foundry, Portland, Northwest Regional Conference chairman, announced plans for the Conference to be held in Portland, October 14-16. The entire first day will be devoted to a casting clinic.—*Bill Walkins.*

Central New York

The March meeting at Hotel Onondaga, Syracuse, was attended by 116 members. Chairman Joe Gibson, Sweets Foundry, Johnson City, opened the meeting, then turned it over to vice-chairman James Ochsner, Crouse-Hinds Co., Syracuse, who introduced the technical speaker of the evening, Zigmond Madacey, Beardsley & Piper Div., Pettibone-Mulliken Corp., Chicago.

Mr. Madacey had originally scheduled his talk to be *"Core Blowing; Fundamentals and Trouble Shooting,"* but in his opening remarks stated that he would like to change it to *"It's My Fault."* He traced the history of core blowing and the major factors involved in making good blown cores, with particular emphasis on sand control, cause of sagging cores, and stressed the importance of cooperation in the foundry between the pattern shop and the core room. To more clearly illustrate proper methods of venting and core blowing, slides pictured core blowing boxes for the very large as well as the small core jobs.—*Bruce R. Artz.*

Tri-State

Fifty-six members and guests attended the March meeting in Tulsa, Okla. O. C. Bueg, Shell Castings, Inc., Erie, Pa., was the guest speaker and his subject was *"Pattern Engineering."*

Mr. Bueg discussed shell molding patterns and stressed the importance of gating, push out pins, plate heating and the bonding material. He also emphasized the value to be obtained from the AFS PATTERNMAKER'S MANUAL.—*A. M. Fisher.*

Central Illinois

Approximately 125 members and guests attended the March meeting held at the American Legion Hall, Peoria, B. L. Bevis, Caterpillar Tractor Co., Peoria, presided, and technical chairman was C. J. Turner, also of Caterpillar.

Guest speaker was W. A. Hambley, Charles Krause Milling Co., Birmingham, Mich., and his subject was *"Casting Defects."* Mr. Hambley, who was chairman of the Final Committee which prepared the AFS book ANALYSIS OF CASTING DEFECTS, gave an authoritative talk on casting defects, never forgetting to bring forth the responsibilities of management in controlling scrap.—*C. J. Turner.*

St. Louis

The March meeting was devoted to patternmaking as a vital part of the foundry industry. A capacity crowd of over 130 members and guests were present for the awarding of the Apprenticeship Contest Awards in the fields of wood and metal patternmaking and in molding. Winners were presented with cash prizes as well as student memberships in the St. Louis Chapter by apprentice training chairman, Dae Arnette, Arnette Pattern Co., Granite City, Ill. In addition, three pattern apprentices were given certificates of completion for having finished their training.

Highlight of the meeting was an address by Guy A. Pealer, General Electric Co., on the subject *"Pattern Engineering and Coordination of Methods to Produce Better Castings."* The speaker opened his talk with some of the early history of the metal working and foundry industries and a discussion of some of the first methods of metal fabrication. On the subject of patterns, he emphasized the importance of getting substantial and accurate patterns if good castings are to be produced. Cheap and makeshift patterns are no bargain and usually result in high-priced

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FRANK M. ROBBINS, JR., ROBBINS & BOHR

TENNESSEE . . Speakers table at the March Management Night meeting, from left to right: H. Roach, Laclede-Christy Co.; W. Stephens, Tennessee-Alabama Pipe & Foundry Co.; D. B. Shannon, Somerville Iron Works; W. M. Hamilton, Crane Co., Chattanooga Div.; and guest speaker H. J. Heine, AFS technical director.

castings. Lower casting costs will result from close cooperation between the design engineer and the foundryman and from patterns that will permit economical production in the foundry. Among the hazards to be avoided, are combination or "family" patterns and half core boxes, rather than full core boxes and driers. Before patterns are made, their cost must be considered with the overall casting price.—*Jack Bodine, Jr.*

Twin City

The March meeting was devoted to a panel discussion of sand practices in gray iron, steel and non-ferrous foundries.

Panel members selected from local foundries were: gray iron sands, L. M. Malis, Crown Iron Works, Co., Minneapolis; steel sands, E. Anderson, American Hoist & Derrick Co., St. Paul; and non-ferrous sand, C. C. Hitchcock, R. C. Hitchcock & Sons, Inc., Minneapolis. H. H. Blosjo, Minneapolis Electric Steel Castings Co., Minneapolis, acted as moderator.

The panel unanimously stressed one basic principle applying to all shops—rigid adherence to control test limits established on the basis of performance of the sand under the conditions found in the individual shops.—*R. J. Mulligan.*

Philadelphia

At the March meeting, held in the Murrel Dobbins Vocational Technical School, a panel discussion was held on the topic *"Training of Foundry Personnel."* Approximately 150 persons were in attendance, and they visited the foundry division of the school before dinner. Apprentices were at their respective positions, molding, making cores, melting metal and closing molds for pouring. Examples of their work was shown to all present. Some of the students have won prizes in national contests. The one thing outstanding was the eagerness of the boys to do their jobs.

After dinner the panel presentation held sway. On the panel were representatives of the U.S. Government educational division, the foundry industry, the board of education, the business world and the apprentice himself. Each speaker talked for several minutes, and at the end of the session, a question and answer period was held. The topic invariably under discussion was the handling and placing of the apprentices after school was done.

The final thought was that all present: government, industry, school and business, would endeavor to work out some plan, which would enable apprentice boys to take their rightful place in the foundry industry.—*Charles R. Sweeny.*

Michigan State College

The Michigan State Student Chapter of American Foundrymen's Society will present its Annual Student-Industry Banquet May 10. The meeting will be held at Michigan State College, Union Parlors, Student Union Building, East Lansing, Mich. Guest speaker for the affair will be Forrest Anderson, head coach, Michigan State College Basketball Team.—*Clare Thomas.*

Reading Foundrymen's Association

N. Levin, Girdler Corp., New York, was the principal speaker at the March meeting held in the Walnut Room of the Berkshire Hotel. H. Earl Blanton, Atlantic Steel Castings Co., Chester, served as moderator of the panel discussion which followed the principal address.

Mr. Levin traced the phenomenal progress that is being made in the high frequency core baking in the foundry industry and described the new dielectric ovens.

President James Woodward presided at the business session, and Howard Edsall, Birdsboro Steel Foundry & Machine Co., served as technical chairman. Mr. Woodward appointed a Nominating Committee to select nominees for officers for the next fiscal year, beginning May 1, 1955.—*W. I. Cassidy.*

Connecticut Non-Ferrous Assn.

The March meeting was held at the Quinnipiack Club, New Haven, and Nelson B. Stevens, Induction Heating Corp., Brooklyn, N. Y., spoke on *"Electric Core Baking."*

In opening his talk, Mr. Stevens touched upon the development and years of research required to build production units and his company's pioneering endeavors in this field. He described a process which uses the fundamental principles of dielectric heating. Green cores are passed on a conveyor between two flat electrodes at speeds ranging up to 10 fpm, depending on mass and height of cores to be baked. Cores are rapidly heated uniformly throughout their cross section by the electronic field between the electrodes and in a matter of minutes or possibly seconds, depending on mass and moisture content. After all the water has been evaporated from the core, the core may rise only slightly in temperature, however, overbaking is impossible since the rate of power absorption decreases directly with decrease in moisture. As soon as the cores leave the electrodes, they are ready for use.—*Frank B. Diana.*

TWIN CITY . . Speakers panel at the March meeting where Foundry Sand Practices were discussed, from left to right: E. Anderson, American Hoist & Derrick Co.; L. Malis, Crown Iron Works Co.; C. C. Hitchcock, R. C. Hitchcock & Sons, Inc., and moderator H. H. Blosjo, Minneapolis Electric Steel Castings Co.

Chapter Meetings

May

2 . . Central Indiana
Athenaeum Turners, Indianapolis. Past Chairmen's Night, L. D. Richardson, Eutectic Welding Alloys Co., *"New Developments in Foundry Welding."*

2 . . Western Michigan
Bill Stern's, Muskegon. F. S. Brewster, Harry W. Dietert Co., *"Sand Practice."*

2 . . Central Illinois
American Legion Hall, Peoria. Lester B. Knight, Lester B. Knight & Associates, *"Modernization of Foundries."*

2 . . Chicago
Chicago Bar Association, Chicago. J. Harry Jackson, Battelle Memorial Institute, *"Casting of Titanium and Titanium Alloying."*

2 . . Metropolitan
Essex House, Newark, N. J. Dr. Nicholas Grant, professor of metallurgy, M.I.T., *"The Glascast Molding Process."*

3 . . Rochester
Hotel Seneca, Rochester. Annual Business Meeting and Election of Officers.

5 . . Saginaw Valley
Fischer's Hotel, Frankenmuth, Mich. Student-Teacher Night. Professor C. C. Sigerfoos, Michigan State College.

6 . . British Columbia
Pacific Athletic Club. E. Boyle, Boyle Foundry Supply, Seattle, Wash., *"Carbon Dioxide and Cores."*

7 . . Southern California
Clock Country Club, Whittier, Cal. Annual Ladies Night.

9 . . Timberline
Oxford Hotel, Denver. H. Weber, engineer of safety and hygiene, American Foundrymen's Society, *"Safety, Hygiene & Air Pollution in the Foundry."*

9 . . Cincinnati District
Cincinnati Club, Cincinnati, Ohio. R. A. Witschey, A. P. Green Fire Brick Co., Chicago, *"Foundry Refractories."*

10 . . Northern Illinois-Southern Wisconsin
Lafayette Hotel, Rockford, Ill. Warner Bishop, manager, Archer-Daniels-Midland Co., *"Common Sense in Cores."*

10 . . Twin City
The Covered Wagon, Minneapolis. Old Timers' Night. Charles Arps, Public Relations Div., Allis Chalmers Manufacturing Co., Milwaukee, *"Our Most Valuable Asset."*

11 . . Oregon
Corvallis, Oregon. Visit to Oregon State College Foundry. E. Huffschmidt, manager, Western Foundry, *"The Future of the Foundry."*

12 . . Northeastern Ohio
Tudor Arms Hotel, Cleveland. Old Timers' and Past Presidents' Night.

13 . . Tri-State
Biltmore Hotel, Oklahoma City. A. J. VanHarn, Grindle Corp., Harvey, Ill., *"Dust, Smoke, and Fume Control."*

13 . . Philadelphia
Engineers' Club, Philadelphia. Raymond C. Huntoon, Pressure Match Plate Co., Inc., *"Production Patterns by the Plaster Process Method."*

13 . . Ontario
Royal York Hotel, Toronto. Annual Meeting. Ladies Night.

13 . . Birmingham
Tutwiler Hotel, Birmingham, Ala. Installation of new officers. Film on new Ford foundry.

13 . . Wisconsin
Schroeder Hotel, Milwaukee. Old Timers' and Apprentices' Night.

13 . . Southern California
Rodger Young Auditorium, Los Angeles, Cal.

13 . . Central New York
Onondaga Hotel, Syracuse, N. Y. William G. Parker, Elmira Foundry Div., General Electric Co., *"Casting Finish."*

16 . . Northern California
Shattuck Hotel, Berkeley, Cal. Air Pollution Meeting.

16 . . Quad City
Hotel Fort Armstrong, Rock Island, Ill. Panel Discussion on casting finish and core sand practice.

18 . . Central Michigan
Hart Hotel, Battle Creek, Mich. Harry H. Kessler, Sorbo-Mat-Process Engineers, St. Louis, *"Economics of Good Foundry Operation."*

18 . . Oregon
Columbia Athletic Club, Portland. M. J. O'Brien, Atlas Foundry, *"Steel Casting Properties as Affected by Design."*

20 . . Chesapeake
K. A. Kirby, Caterpillar Tractor Co., York, Pa., *"Foreman Training."*

20 . . Tennessee
Patten Hotel, Chattanooga. Round Table and Stump the Experts.

23 . . Northwestern Pennsylvania
Moose Club, Erie. Smorgasbord. Annual Meeting and Elections.

19 . . Washington
Rainier Golf Club, Seattle, Wash. M. J. O'Brian, Atlas Foundry, Tacoma, Wash., *"Steel Castings."*

26 . . Texas
Rice Hotel, Houston. Annual Business Meeting and Installation of Officers.

June

10 . . Southern California
Rodger Young Auditorium, Los Angeles. Past Officers Night.

WALTER V. NAPP, DELTA OIL CO.

WISCONSIN . . At the March meeting Management Night, from left to right: Allen A. Evans, International Harvester Co., guest speaker who talked on "Practice Applications at Foundry Quality Control" and chapter president R. V. Osborn, Lakeside Malleable Castings Co.

BIRMINGHAM . . C. K. Donoho, American Cast Iron Pipe Co., presenting details of the forthcoming Educational Program on Advanced Foundry Methods at the March meeting.

CENTRAL MICHIGAN . . At the March meeting, left to right: Maynard Fiandt, Superior Brass & Aluminum Co.; Harry St. Johns, Crane Co., guest speaker; and Kenneth Rhoads, Engineering Castings, Inc.

Foundrymen

continued from page 54

New York, New Jersey, Delaware, Pennsylvania, and Maryland areas. **Herbert E. Wright,** who formerly represented Kindt-Collins Co. in these areas, has been transferred to Milwaukee, Wis., as branch manager and will represent Wisconsin, Illinois, Iowa, Missouri, and Minnesota.

Arthur T. Dalton has been elected vice-president in charge of sales of Chicago Wheel and Mfg. Co. **Henry M. Mann,** formerly treasurer and chief of sales engineering, was elected secretary-treasurer of Chicago Wheel and Mfg. Co.

Theodore Kauffman, Jr., has been elected president of S. Obermayer Co., Chicago. He succeeds **Theodore Kauffman,** who becomes chairman of the board. Mr. Kauffman, Jr., who was vice-president in charge of the company's Ramtite Div. (refractory specialties), is succeeded by **George V. Campbell.**

Joel Burnette has been appointed sales engineer in the Foundry Sales Dept. of C. O. Bartlett & Snow Co.

John A. Dahlem has been appointed to the sales staff of Syntron St. Louis Sales Co.

Joseph V. Rozycki has been appointed district manager in charge of the new branch of Whiting Corp. at 660 St. Catherine St., West, Montreal 2, Quebec, Canada. **J. Noel Pierce** will be assistant district manager.

W. P. Perkinson has been appointed Philadelphia district sales manager for the American Chain Div. of American Chain & Cable Co.

Frank Day has been appointed to the sales staff of Syntron Los Angeles Sales Co. Mr. Day will be a tool salesman and serviceman located in the Los Angeles office. **Thomas Lewis Hainline** has been appointed tool salesman for Syntron Kansas City Sales Co. He will handle sales and accounts in that area. **John Sirles,** formerly with Syntron New York Sales Co., has been transferred to Syntron Newark Sales Co.

James G. Richmond has been promoted to manager of manufacturing for Indiana Steel Products Co., Valparaiso, Ind.

William J. Leighton has joined the Philadelphia district sales office of F. J. Stokes Machine Co., Philadelphia, as a sales engineer.

Wallace J. Keith has been appointed sales engineer to open the second Ohio sales office of Acheson Colloids Co. The new office will be located in Dayton (6), Suite 40, 627 Salem Avenue. Mr. Keith will provide technical service to Acheson customers located in western and southern Ohio, as well as most of Indiana and Kentucky.

Edward C. Conner has been appointed works manager of the Greensburg, Pa., Works of the Walworth Co. Mr. Conner, formerly production control manager, succeeds **Carl F. Lundbom,** works manager since 1952, who has retired after 43 years of service.

Joseph C. Fox, long associated with Doehler-Jarvis Corp. as chief metallurgist, has opened his own office at 4401 Jackman Road, Toledo 12, Ohio, for consultation on matters pertaining to the chemical and metallurgical phases of the die casting process.

Norman W. Rowand, general manager of the Pittsburgh Div., Rockwell Manufacturing Co., has been named assistant to the vice-president. **Paul A. Mankin,** chief engineer of the local division, has been named general manager, and **Arthur W. Krause,** assistant general manager, has been named factory manager.

M. W. Reynolds has been appointed general manager of Acheson Colloids Co., and **P. C. Buck** has been named to take charge of engineering and production for Acheson Industries, Inc. Both are vice-presidents of Acheson Industries, Inc., of which Acheson Colloids Co., Port Huron, Mich., is a division.

P. A. Burns, district sales manager for Hewitt-Robins Inc., Cleveland, has been appointed manager of sales at the company's conveyor machinery manufacturing plant in Passaic, N. J. **A. J. Ball,** sales engineer in Detroit, will succeed Mr. Burns as manager in the Cleveland district.

G. A. Gilbertson and **R. L. Beyerstedt** have been promoted to executive vice-presidents of Frank G. Hough Co., Libertyville, Ill.

CASTING through the Ages

TO ENHANCE THEIR REPUTATION, SOME ITALIAN GUN CASTERS OF THE MID-1500'S BOASTED THEY POSSESSED SECRETS WHICH ENABLED THEM TO TURN OUT CANNON THAT NOT ONLY SHOT BALLS BUT ALSO EMITTED LIGHTNING FLASHES!
Before HANGING A MEDIAEVAL CHURCH BELL AFTER IT WAS CAST, IT WAS USUALLY INVERTED AND FILLED WITH LIQUOR WHICH WAS DISPENSED TO THE PARISHIONERS TO CELEBRATE THE EVENT.
ABOUT 120,000 DEER MADE OF CAST IRON GRACED AMERICAN LAWNS AS ORNAMENTS IN 1850.
Odd Bits
AS EARLY AS 1760, PENNSYLVANIA FOUNDRIES WERE CASTING 5-, 6- AND 10-PLATE IRON STOVES ON A MASS PRODUCTION BASIS BY POURING MOLTEN METAL DIRECTLY FROM THEIR FURNACES INTO OPEN SAND MOLDS.

Book Reviews

The Light Metals Handbook—Text and Tables . . George A. Pagonis. Volume I, 200 pages; Volume II, 232 tables on 185 pages. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. $8.50 (1954).

Facts and information on aluminum and magnesium and the alloys of each are compiled in two volumes to serve aircraft, industrial, and civil engineers, fabricators, and light metal foundries, as well as men developing engineering specifications. Among the topics covered are: classes and choices of casting alloys, detailed properties of individual compositions, casting characteristics, heat treatment, machinability, and joining methods. Data are presented on mechanical properties of alloys at room, low, and high temperatures. Ninety four tables on magnesium-base alloys and 138 tables on aluminum-base alloys are keyed with the text to facilitate quick reference.

Shell Molding and Shell Mold Castings . . T. C. Du Mond. 128 pp., 35 illus., 20 ref., pocket size (4¼ x 6¾), Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. $2.00 (1954).

The story of shell molding is told in chapters on description and history, advantages and limitations, costs, materials, and equipment. Other chapters deal with designing for shell molding, pattern materials, and a comparison with other forming processes.

Titanium and Titanium Alloys . . John L. Everhart. 184 pp., pocket size (4¼ x 6¾). 30 fig., 17 tables, 117 ref. Reinhold Publishing Corp., 330 West 42nd St., New York 36, N. Y. $3.00 (1954).

History; properties of pure titanium, commercial titanium, and titanium alloys; forming by every means; cleaning; finishing, and heat treating are presented to interest the engineer or designer in the possibilities of using titanium. Technology presented is not for producer of titanium or for research and development.

Welding for Engineers . . Harry Udin, Edward R. Funk, and John Wulff. 430 pp., 215 fig., 15 tables, 76 ref., glossary, and problems. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50 (1954).

This textbook at the level of introductory engineering course, draws from physics, mathematics, chemistry, metallurgy, and mechanical engineering the principles of welding processes. Treated at chapter length are cold, hot pressure, and resistance welding, and arc and chemical heat methods of fusion welding. Included are chapters on brazing and weld inspection and testing.

Densening and Chilling in Foundry Work . . Edward Longden. 178 pp.. 110 fig., 9 tables, Charles Griffin & Co., Ltd., 42 Drury Lane, London, WC2, England, $3.92. (1954).

Structural soundness and density of ferrous and non-ferrous castings are related to the speed of metal solidification in a particular zone of the casting by heat conductivity and heat absorption. Mr. Longden covers the choice and manipulation of metal composition, mold production with adequate provision for compensating liquid shrinkage and minimum restriction to solid contraction, and the selection of mold materials with most effective thermal resistance, thermal conductivity, and mold wall stability.

The book covers the production of castings of high-duty and general irons, carbon and alloy steels, malleable iron, and non-ferrous alloys with controlled solidification to produce sound castings without chilling or to produce castings with selected surfaces chilled to a desired depth.

Chapters deal with the design, use, and effectiveness of different types of denseners and the densening action of permanent mold and centrifugal casting methods. Casting methods are shown for: bosses and hubs, gear blanks, grooved pulleys, die blocks, steam-engine cylinders, bed castings, car wheels, rolls, and solid bars and tubes.

Heat Treatment of Gray Iron . . C. O. Burgess. 117 pp., 129 fig., 11 tables, 130 ref. Gray Iron Founders' Society, Inc., 930 National City, East 6th Bldg., Cleveland 14, Ohio. $5.00 (1954).

Described are heat treatments of gray iron to provide engineering properties superior to those as cast and resulting in economies to producer and purchaser.

Besides discussing the causes and results of internal stresses the author relates temperature, time, and rate of cooling and the degree of initial stress to the stress relieving of gray iron castings.

The mechanism of annealing or softening is explained; annealing temperatures and times are recommended, and applications given. Increased machinability and other favorable effects on casting properties are presented as well as adverse effects.

Metal compositions, methods and equipment, procedures, and final properties of hardening for wear resistance or increased strength by flame, induction, and quenching, and applications are presented. Phase diagrams are used to explain the metallurgy of heat treatment.

Handbook of Industrial Safety Standards . . 315 pp., 72 fig., 20 tables. Accident Prevention Dept., Association of Casualty & Surety Companies, 60 John Street, New York 38, N. Y. (ninth revision) $1.40 (1954).

A general coverage of the entire industrial safety field with codes and recommendations from national authorities on safety programming and accident investigation; first aid and hospital facilities; sanitation, illumination, and housekeeping; handling and storing materials; guards and precautions for specific types of equipment: dusts, vapors, gases and exhaust systems; acids, caustic liquids, and radiation hazards. Sources of pertinent safety codes not detailed in the manual are listed.

Machine Shop Operations and Setups . . Harold W. Porter, Charles H. Lawshe, and Orville D. Lascoe. 397 pp., 381 fig., 24 tables. American Technical Society, 848 East 58th St., Chicago 37, Ill. $5.50 (1954)

Industry and education have contributed to the content and presentation of machine shop practice on measuring tools, bench tools, drill press, engine lathe, shaper and planer, milling machine, and grinding machine. Presented for each machine are: its construction and capacity, types or varieties available, cutting tools employed, work-holding devices and accessories, and setup and production operations. 107 of the latter are indexed for easy reference. The text is written with a vocabulary found both basic and prevailing. Safety practices are illustrated and precautions are listed for each operation.

Cited for Outstanding Safety Record

Presentation of Certificate of Merit for outstanding safety record for 1954 at the Foundry Div., Hansell-Elcock Co., Chicago, was made recently. Plant had only eight chargeable accidents during 1954, involving a total of 30 lost days. Above, left to right, S. C. Massari, plant manager; Stanley Wozniak, molding department supervisor; Al Grankowski, safety director, and Robert Whiteside, Employers Mutual Liability Insurance Co. of Wisconsin.

Obituary

Henry S. Washburn, chairman of the board, Plainville Casting Co., Plainville, Conn., died March 31 in Clearwater, Fla., after a short illness. He had been president and chairman until this January. Active in AFS, Mr. Washburn was president of the Society in 1939-40 and served as a director from 1935 to 1938. In 1947 he was awarded the Joseph S. Seaman Gold Medal for outstanding service to the American Foundrymen's Society and the casting industry as a whole and particularly for his valuable contributions to the gray iron castings industry. He was a member of the National Foundry Association and served as a member of their administrative council from 1937 to 1939. Mr. Washburn was twice director of the Gray Iron Founders' Society (1936 and 1941-44), and in 1946 he received a G.I.F.S. citation for distinguished service to the society and the industry. He was also a member of the Connecticut Foundrymen's Association.

Born in Brooklyn, N. Y., Mr. Washburn received his early education at St. Paul's School, Garden City, N. Y., and later attended Yale University. His first commercial position was as bookkeeper with the Corn Exchange Bank of New York. From 1906 to 1917 he held various positions as clerk, credit man, and office manager with the D. L. & W. Railroad, H. B. Claflin Co., and Butler Bros. of New York

Henry S. Washburn

City, respectively. From 1917 to 1921, when he founded Plainville Casting Co., Mr. Washburn was purchasing agent for Turner & Seymour Manufacturing Co., Torrington, Conn.

Here's How **National Radiator Co., Johnstown, Pa., sliced labor-hours for loading and unloading highway trailers by 50 per cent and insured damage-free transportation of cast iron boiler sections and other heating products. The company was faced with twin problems: how to transport, damage-free, the cumbersome cast iron boiler sections; and how to cope with the overhead cost entailed in many man-hours needed to load and unload the trucks. Under standard method of loading the company used steel strapping, wooden bulkheads, and wood blocking to prevent over-the-road damage. R. G. Lane, general traffic manager for National contacted the Brown-Line Corp., Beverly Hills, Cal., manufacturer of equipment used to secure loads in cargo aircraft. The equipment consisted of aluminum extrusions designed with eyelets to support a crossmember at each one-half inch interval. The fasteners which go into the half-inch marks had been designed originally for attaching to the ends of heavy canvas webbing or strapping, but to support its much heavier boiler sections, National substituted heavy pieces of seamless steel tubing as crossmembers.** *National Radiator Co.*

Abstracts

Abstracts below have been prepared by Research Information Service of The John Crerar Library, 86 East Randolph Street, Chicago 1, Ill. For photoduplication of any of the complete articles briefed below, write to Photoduplication Service at the above address, identifying articles fully, and enclosing check for prepayment. Each article of seven pages or fraction thereof is $1.40, including postage. Articles over seven pages are an additional $1.40 for each seven pages. A substantial saving is offered by purchase of coupons in advance. For a brochure describing Crerar's library research service, write to Research Information Service.

A583..."What is Silica Sand?" Clyde A. Sanders, and O. Jay Myers, AMERICAN FOUNDRYMAN, vol. 26, no. 6, Dec. 1954, pp. 56-59. Clarification of sand terminology and definitions to standardize use in technical and promotional literature.

A584..."Layer Method for Determining Teeming Speeds and Mold Orientation for Making Steel Castings," Sten H. C. Forslund, *Foundry Trade Journal,* vol. 97, no. 1988, Oct. 7, 1954, pp. 407-411; vol. 97, no. 1989, Oct. 14, 1954, pp. 437-443. After discussing the mechanism of cold-shut formation, the critical minimum rising speed of the metal in the mold, and bottom and lip pouring, the author presents his method of determining the pouring rate for steel castings (applicable in its major aspects to other alloys).

A585..."Defects in Vitreous-enamelled Iron Castings," E. R. Evans, *Foundry Trade Journal,* vol. 97, no. 1988, Oct. 7, 1954, pp. 421-425; and vol. 97, no. 1989, Oct. 14, 1954, pp. 451-457. Defects are discussed, attributed to foundry or enamel shop. Corrective measures are proposed.

A586..."Die-Pressing of Gutters," R. S. M. Jeffrey and J. A. Richards, *Foundry Trade Journal,* vol. 97, no. 1990, Oct. 21, 1954, pp. 467-477; vol. 97, no. 1991, Oct. 28, pp. 509-512 (discussion). Cast iron drain gutters, half-round, 6 ft long are produced in a mechanized horizontal-parting permanent mold operation in which a measured amount of iron is poured into the female die then displaced into shape by closing the male die just long enough to solidify yet not chill the casting.

A587..."Induction-Hardened Slideways on Cast Iron Lathe Beds," W. Malmberg. *Foundry Trade Journal,* vol. 97, no. 1991, Oct. 28, 1954, pp. 513-514. (From *Werkstattstechnik und Maschinenbau,* vol. 44, no. 3, Mar. 1954, pp. 104-108.) Fundamental principles, close control of metal quality, and susceptibility to distortion are discussed.

A588..."Metallic-arc Welding of Spheroidal-graphite Cast Iron," F. A. Ball, and D. R. Thorneycroft, *Foundry Trade Journal,* vol. 97, no. 1991, Oct. 28. 1954,

pp. 499-507; vol. 97, no. 1992, Nov. 4, 1954, pp. 541-547; and vol. 97, no. 1993, Nov. 11, 1954, pp. 575-578 (discussion). The welding of spheroidal-graphite cast iron in pearlitic and ferritic conditions with nickel-iron and aluminum-bronze electrodes; detailed analysis of structures of weld and adjacent iron; also relationship between properties and micro-structures and effects on them by heat-treatment.

A589..."Production of Castings for Woodworking Machinery," R. Higgins, *Foundry Trade Journal*, vol. 97, no. 1993, Nov. 11, 1954, pp. 581-586; vol. 97, no. 1994, Nov. 18, pp. 607-611. Molding procedures for producing many machine parts in the foundry of one of the largest manufacturers of woodworking machinery.

A590..."Shell Molding and the Economic Use of Materials," Robert K. Jackson, *Foundry Trade Journal*, vol. 97, no. 1994, Nov. 18, 1954, pp. 597-601. Author considers shell molding process, advantages, and limitations and offers practical method of reducing the high resin and sand cost.

A591..."Aspects of Metallurgical Control in the Modern Steel Foundry," N. Y. Newton, *Foundry Trade Journal*, vol. 97, no. 1955, Nov. 25, 1954, pp. 625-630. A discussion of the principle controls which make possible metallurgical quality of steel castings.

A592..."Air-cooled Engine Manufacture," *Foundry Trade Journal*, vol. 97, no. 1995, Nov. 25, 1954, pp. 637-638. Brief discussion of German developments in centrifugal bi-metallic casting of copper fins on a cast iron cylinder wall to obtain more effective heat dissipation and permit higher speeds and increased power output.

A593..."Founding of Marine Propellers," John M. Langham, *Foundry Trade Journal*, vol. 97, no. 1986, Sept. 23, 1954, pp. 343-348; vol. 97, no. 1987, Sept. 30, 1954, 387-394; and vol. 97, no. 1988, Oct. 7, 1954, pp. 413-416. Review of methods of manufacturing built, solid, and controllable pitch marine propellers.

A594..."Automation Within Reach of Many Foundries," W. E. Dougherty, *Iron Age*, vol. 174, no. 17, Oct. 21, 1954, pp. 224-227. Pattern adaptation to standardized molding lines equipped with mechanical devices together with a plan of control (especially sand) can bring automation to most foundries.

A595..."Practical Molding Sand Control," Frank S. Brewster, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 102-107. Discussion of structural, green, air set, dry, and hot properties of sand and sand mixes that are controllable. Automatic moisture control and sand lab layout are diagramed.

A596..."Fundamentals of Synthetic Molding Sand," Norman J. Dunbeck, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 108-111. Fundamentals and recent developments that allow almost any sand property to be achieved and maintained by correct combinations of sand, bond, and additives.

A597..."Naturally Bonded Molding Sand," Richard H. Olmsted, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 112-114. Types, supply, and uses of naturally bonded sands preferred when testing equipment, conditioning facilities, and control personnel are limited.

A598..."Molding Sand Use in the Gray Iron Foundry," W. G. Parker, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 116-121. Sands, and properties, and sand control are applied to gray iron practice to gain casting quality with reduced costs.

A599..."Steel Foundry Molding Sand," John B. Caine, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 122-125. Standardized specifications for molds of various sizes are listed, and the effect of sand mix ingredients on casting quality is discussed.

A600..."Molding Sand Practice in the Malleable Foundry," L. E. Emery, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 126-129. Sand types and additives are related to malleable practice.

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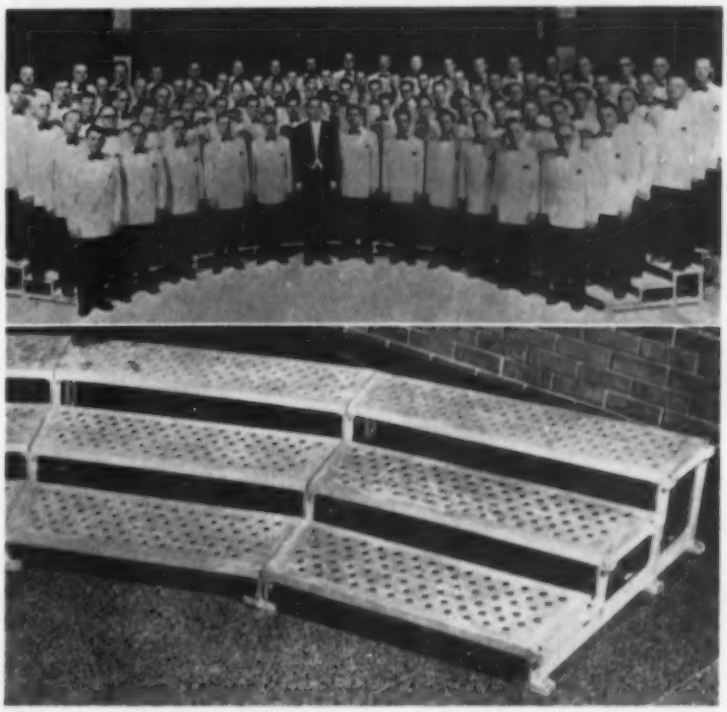
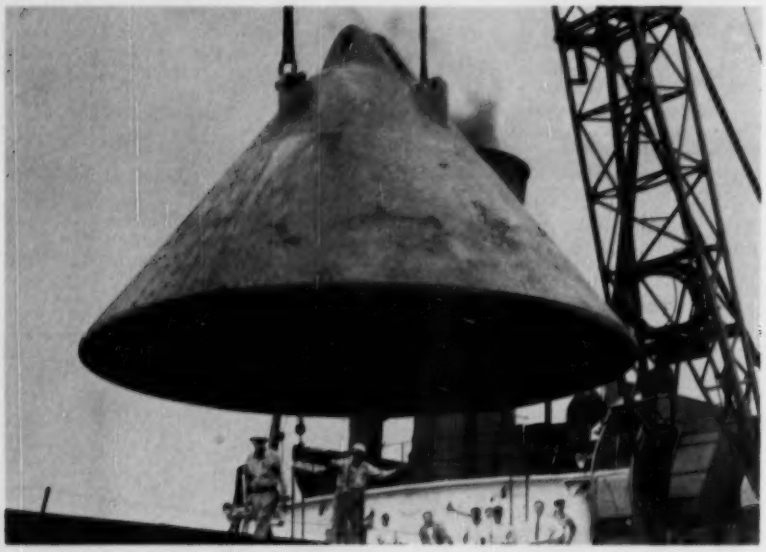


Here's How Osvald Berntsen, Berntsen Brass & Aluminum Co., Madison, Wis., produced an ingenious portable aluminum stage, weighing only 350 lb but capable of accommodating as many as 50 people or 20,000 lb. It is now being used by Normennenes Sangforening, a Norwegian-American singing society from Chicago, of which Mr. Berntsen is a member, on its music tours throughout Europe and the United States. Mr. Berntsen designed and then had cast at his company's foundry, a three-level semi-circular portable platform. Constructed of Federated Tenzaloy, a high-strength, extremely lightweight and corrosion-resistant aluminum alloy originated and produced by Federated Metals Div., American Smelting and Refining Co., the three-level stage consists of thirty 14 x 48 in. sections all held together by a lock pin arrangement. Floor space requirements are minimal, only 36 x 10 ft. Tenzaloy met the needs of the Berntsen foundry for an aluminum alloy that will age at room temperature and produce mechanical properties equivalent to those normally obtained by solution treating, quenching and artificial aging. This alloy enables foundries lacking heat treating equipment to produce high strength aluminum castings, particularly large or intricate ones which are not amenable to heat treatment. No special foundry technique is required; only heating to required temperatures, skimming and casting. Cast in sand molds, the Tenzaloy metal used in the stage has a tensile strength of 35,000 psi, yield strength of 25,000 psi and a Brinell hardness of 74 after 10 to 14 days aging at room temperatures. These properties are stable after the initial aging period. In use for over a year, the portable stage has become indispensable to the Normennenes Singing Society. *Federated Metals Div., American Smelting and Refining Co.*

Deliver Bell and Hopper to Great Lakes Steel



A series of blast furnace transportation problems ended at Zug Island recently when cranes lifted a 70-ton cargo, bell (shown above) and hopper from freighter, and deposited it on the dock of the Great Lakes Steel Corp., Detroit division of National Steel Corp. Parts are for a blast furnace being rebuilt and enlarged for Great Lakes by Koppers Co., Pittsburgh, Pa. Pittsburgh Steel Foundry Corp., Glassport, Pa., cast the parts and part of a wall had to be torn away to remove the equipment from the building where it was made.

Here's How **Lackawanna Foundry Co., Lackawanna, N. Y., applies a simple method for keeping foundry molding sand from freezing and caking during off-hours of the winter-time in an unheated building. They lay Thermwire electric heating cable over the sand pile at the end of the work period to keep the sand just above the freezing point. When work resumes, the heating cable is removed and the sand is found in workable condition. Each bench molder has one set of heating cable, 80 ft long and rated 400 W, with which to quickly cover and uncover the sand at the start and finish of the day. Before Thermwire was put to use, it was necessary to heat the sand by means of salamander stoves. Reconditioning of the fine foundry sand in this manner meant considerable loss of time and extra labor. In addition the salamander stoves produced noxious fumes that made working conditions unpleasant. *Edwin L. Wiegand Co.***

Abstracts

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A601 .. "Molding Sand in the Brass Foundry," William B. George, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 130-133. Specifications are given for natural and synthetic sands for three weights of brass castings. Reaction of sand to molten brass is described.

A602 .. "Aluminum Foundry, Molding Sand Use," Walter J. Klayer, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 134-137. Specifications and control of a natural molding sand that insure production of high quality aluminum castings with regularity.

A603 .. "Magnesium Molding Sand," K. J. Hopp, *Foundry*, vol. 82, no. 11, Nov. 1954, pp. 138-139. Discussion of chemical and physical control necessary for good magnesium practice.

A604 .. "New Mechanized Foundry," *Iron & Steel*, vol. 27, no. 12, Nov. 1954, pp. 527-529. Plant write-up of W. & T. Avery, Ltd. gray iron foundry set up to produce 1 ton castings per man per week.

A605 .. "Inexpensive Shell Molding and Coremaking Machine Handles Job Work," W. G. Patton, *Iron Age*, vol. 174, no. 15, Oct. 7, 1954, pp. 130-132. Simple machine with investment poured on pattern by hand is practical for developing shell mold patterns, testing new materials, and short run production.

A606 .. "High Frequency Induction Furnaces Boost Foundry Melting Capacity, Widen Range of Metals," W. D. Latiano, *Iron Age*, vol. 174, no. 18, Oct. 28, 1954, pp. 95-98. How the addition of high frequency induction melting equipment allowed Sandusky Foundry & Machine Co. to handle stainless, carbon, alloy, and special high alloy steels in addition to centrifugally cast non-ferrous castings up to 60,000 lb.

A607 .. "Automation Unit Performs All Operations in Casting of Small Parts," L. F. Miller, *Iron Age*, vol. 174, no. 19, Nov. 4, 1954, pp. 128-130. An integrating automation unit combines 12 operations from filling flasks to shakeout, increases production, and reduces labor and floor space.

A608 .. "Direct Chill Continuous Casting of Magnesium Proves Practical, Economical," R. K. Paddock, *Iron Age*, vol. 174, no. 24, Dec. 9, 1954, pp. 149-151. Rounds up to 18¾ in. diameter and rectangular ingots 11¼ x 42 in. of magnesium are cast continuously and automatically.

A609 .. "Centrifugal Casting," A. J. Gibbs Smith, *Iron & Steel*, vol. 27, no. 13, Dec. 1954, pp. 577-578. Machine description, operation, and advantages of the latest German practices in centrifugal casting of pipe.

A610 . . "New 60-Ton Arc Furnace," *Iron & Steel,* vol. 28, no. 1, Jan. 1955, pp. 11-13. Europe's biggest electric open hearth has increased firm's ingot steel capacity 20 per cent and allowed other arc and induction furnaces to be used on specialized steels. Installation and operation are described.

A611 . . "Cut Drudgery, Raise Output," *Iron Age,* vol. 174, no. 26, Dec. 23, 1954, pp. 26-27. Special photographic techniques are described and illustrated that show up unproductive effort and also check on corrective measures.

A612 . . "Furance Operation and Casting Improved at Copper Cliff," Joseph C. Bischoff, *Journal of Metals,* vol. 6, no. 11, Nov. 1954, pp. 1194-1196. Nearly 20 years of experience with melting electrolytic cathode copper at International Nickel Co. of Canada, Ltd., are reviewed.

A613 . . "A Turbine-Blade Alloy Castable and Low in Cobalt and Columbium," W. Siegfried and P. Eiserman, *Metal Progress,* vol. 67, no. 1, Jan. 1955, pp. 141-146. Efforts to develop a high-temperature alloy containing a minimum of scarce metals, suitable for mass production by investment casting, are described. Susceptibility of cast and forged turbine blades to thermal shock are related.

A614 . . "Fundamental Study of Clay: XIII, Drying Behavior and Plastic Properties," W. D. Kingery and J. Francl, *Journal of the American Ceramic Society,* vol. 37, no. 12, Dec. 1954, pp. 596-620. Experiments on clay-water masses show the effects of particle size, exchangeable ions, surface tension, and water content on plastic properties and drying behavior.

A615 . . "Full Permanent Mold or Semi-Permanent Mold Castings," G. E. Schmid, *Precision Metal Molding,* vol. 13, no. 1, Jan. 1955, pp. 34-36, 69-71. Differences in grain structure, tolerances, surface quality, and tool cost of permanent mold castings cored with steel and sand cores are discussed.

A616 . . "Magnesium Die Castings Get a Boost, Precision Metal Molding, vol. 13, no. 1, Jan. 1955, pp. 37-38, 48. A report on the adaptation of the hot chamber principle to the die casting of magnesium.

A617 . . "Flatness can be the Toughest Problem." Walter Ugiccini, *Precision Metal Molding,* vol. 13, no. 1, Jan. 1955, pp. 40-43, 65. The evolution of a 10 x 18-in. plate and other parts to plaster casting to obtain desired flatness.

A618 . . "5% More Power, Thanks to a Cool Head," F. B. Esty, *Precision Metal Molding,* vol. 13, no. 1, Jan. 1955, pp. 46, 59. How die casting allowed more and thinner fins on the aluminum engine-head providing increased strength and heat dissipation for an increase in compression ratio.

A619 . . "Dimensional Control of Investment Castings." Edwin G. Chapman, *Precision Metal Molding,* vol. 13, no. 1, Jan. 1955, pp. 43-44, 67-68, 83-84. Understanding the influences of the steps of the investment casting process provides the designer with a realistic approach to dimensional specifications.

A620 . . "Care and Maintenance of Vitreous-enamelling Plant," J. H. Mayall, *Foundry Trade Journal,* vol. 97, no. 1996, Dec. 2, 1954, pp. 673-677. Standardization of equipment, protection against corrosion, and suggestions for ventilation inspection are among maintenance recommendations for a vitreous-enamelling plant.

A621 . . "Castings versus Weldments," H. Mottram, *Foundry Trade Journal,* vol. 97, no. 1997, Dec. 9, 1954, pp. 687-697. Author discusses design, weight, machinability, overhead and comparative cost considerations which cause his firm to make weldments and castings.

A622 . . "Samuel Fox's New Melting Facilities," *Foundry Trade Journal,* vol. 97,

continued on page 164

Displays AFS Company Membership Plaque

Harold W. Johnson, vice-president of Wells Manufacturing Co., Skokie, Ill., right, watching President M. K. Wells place AFS Company Membership plaque on wall.

Ceramic Society Dedicates New Headquarters

New building housing business and publication offices of the American Ceramic Society, Columbus, Ohio, was dedicated recently. Presiding at the program was A.C.S. President Roy W. Pafford of Ft. Worth, Texas. A show place of ceramic products, the approach to the new headquarters is flanked by a natural colored terra cotta corner pylon. Extensive use of ceramic materials includes: exterior and interior walls of brick and clay tile, clay tile roof, brick sidewalks, clay tile floors, and ceilings of acoustical tile and fiber glass. Glass is used in windows, doors, and in glass block panels. Porcelain is used in many ways. One hundred-year-old and modern made brick from clay of the area are worked into the building.

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Western Distributor: WILSON & GEO. MEYER & CO., San Francisco
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For more facts, circle No. 458 on postage-free Reader Service card on p. 47 or 48

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Abstracts

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no. 1999, Dec. 23, 1954, pp. 741-746. A write-up of the installation and operation of the largest electric arc furnace in Europe. Another article on this 60-ton furnace is abstracted from *Iron & Steel*.

A623.. "Exhaust Ventilation of the Patternshop," E. Bradley, *Foundry Trade Journal*, vol. 98, no. 2001, Jan. 6, 1955, pp. 5-9. Theory of and applications for removing wood refuse from patternshop operations are discussed and illustrated.

A624.. "Accidents in Foundries," *Foundry Trade Journal*, vol. 98, no. 2001, Jan. 6, 1955, pp. 15-18. Discussion and data from the Annual Report (1953) of the Chief Inspector of [British] Factories dealing with accidents in foundries. Material handling, molten metal operations, molding machines, and abrasive wheels, are among topics included.

A625.. "Research into the Use of Tannin-Base Corebinders," *Foundry Trade Journal*, vol. 98, no. 2001, Jan. 6, 1955, pp. 11-12. An interim report of efforts to use tannin-formaldehyde resin as a cold setting core bonding agent.

A626.. "A Practical Method for Vacuum Degassing of Non-Ferrous Metals," Harold F. Bishop, Edward E. Layne, and William S. Pellini, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 78-83, 242, 246-247. Causes of porosity in non-ferrous castings are discussed; castings made from metal melted in a vacuum and from metal melted in atmosphere and cast with strong and weak directional solidification were tested for porosity. Research equipment is described and benefits of degassing are discussed.

A627.. "Eliminating Defects in Die Castings," W. M. Halliday, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 84-85, 225, 228, 230, 232-237. Defects should be checked by examining the castings, dies, working conditions, and the alloy. Flash, flow marks, and porosity are discussed at length.

A628.. "Closed-Top Cupolas End Air Contamination," Robert H. Herrmann, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 86-89. Operation of closed top cupolas which are coupled in pairs to a heat exchanger and fly ash collector.

A629.. "Modern Methods Employed in Berliet Foundries of France," Vincent Delport, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 90-93, 242. Write-up of captive foundry operations of the leading French maker of heavy vehicles. Monthly output averages, 1000 tons iron, 500 tons steel, and 70 tons bronze and aluminum castings.

A630.. "Cleaning Room Bottleneck," Robert H. Herrmann, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 94-99, 220-222, 224. Write-up of the operations of Empire Steel Castings Inc. stresses the effects of cleaning room modernization on costs.

A631..."Some Properties of Phenolic Resin Core Binders," Carl A. Schubert, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 100-101, 248-51. Cores bound with five separate thermosetting resins, baked at three temperatures for various lengths of time are tested for tensile strength, loss of strength due to reheat, loss of strength due to moisture absorption, and gas evolution.

A632..."Centrifugal Casting of Sleeve Bearings," J. B. Mohler, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 102-105. Author discusses centrifugal casting techniques, particularly bimetallic casting.

A633..."Casting Pickled in Half the Time," Robert H. Herrmann, *Foundry*, vol. 82, no. 12, Dec. 1954, pp. 135, 138. Description of facilities and operations which allow one man to do the work of two at the new pickling plant of Lebanon Steel Foundry.

A634..."Automation in Core Making," C. W. Hockman, AMERICAN FOUNDRYMAN, vol. 26, no. 6, Dec. 1954, pp. 36-40. How a five-station indexing turn-table coupled with a core blower and drawing machine increased production with fewer men and in less space than former equipment occupied.

A635..."Holding Blast Humidity Constant," Joseph L. Brooks, AMERICAN FOUNDRYMAN, vol. 26, no. 6, Dec. 1954, pp. 41-43. Effects of blast moisture on melt are discussed and dehumidifying equipment of the Sparta Div. Muskegon Piston Ring Co. is described.

A636..."Letter on pH Control — How Clay and Sand React to Soda Ash," George J. Barker, AMERICAN FOUNDRYMAN, vol. 26, no. 6, Dec. 1954, pp. 44-45. Explanation of pH control by adding sodium carbonate to clays as indicated by research at University of Wisconsin.

A637..."Smog Control in the Foundry," Harry Dok, AMERICAN FOUNDRYMAN, vol. 26, no. 6, Dec. 1954, pp. 46-49. Development, construction, and operation of a bag type dust collection system for an electric steel foundry.

A638..."Rapid Electrolytic Analysis of Tin and Antimony in Lead-Base and Babbit Alloys," Edward H. Huss, AMERICAN FOUNDRYMAN, vol. 26, no. 6, Dec. 1954, pp. 5. Description of a more rapid analysis by using the solution remaining from the antimony separation for the tin determination.

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British manufacturer would like to negotiate with expert in the treatment of metallic abrasives of American standard. Also would welcome and pay for assistance in improving any sand blast process. **Box C28, AMERICAN FOUNDRYMAN, Golf and Wolf Roads, Des Plaines, Ill.**

INDUSTRIAL ENGINEER thoroughly familiar with foundry operations, equipment and methods and experienced in establishing standards. Needed by average size, job shop, steel foundry producing high quality castings. Give complete summary of background and salary requirements. All replies will be treated confidentially. Our foundry personnel know of this advertisement. **Box C26, AMERICAN FOUNDRYMAN, Golf and Wolf Roads, Des Plaines, Ill.**

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Printed below, the poem has been lying dormant for some years but recently appeared in "Vivian Ventures" issued by Vivian Diesel & Munitions, Ltd., Vancouver, B. C. A Vivian machinist apprentice found it in his dad's old tool box.

The designer bent across his board,
Wonderful things in his head were stored,
And he said as he rubbed his throbbing bean,
"How can I make this thing hard to machine?"
If this part here were only straight,
I'm sure the thing would work first rate,
But 'twould be so easy to turn and bore,
It would never make a machinist sore.
I'd better put in a right angle there,
Then watch those babies tear their hair.
Now I'll put the holes that hold the cap,
Way down in here where they're hard to tap.
Now this piece won't work I'll bet a buck,
For it can't be held in a shoe or chuck,
It can't be drilled, or it can't be ground,
In fact the design is exceedingly sound.
He looked again, and cried, "At last!
Success is mine, it can't even be cast!"

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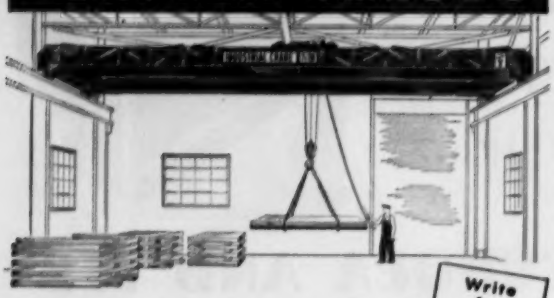

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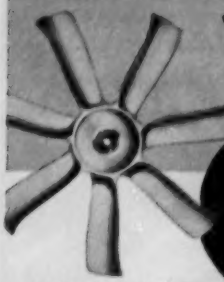

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Dust Control Know-How

Three sections of the forthcoming ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT IN FOUNDRIES have been published and are now available. Section 1, *Introduction to Principles of Foundry Ventilation and Foundry Hygiene Problems* is printed in one pamphlet; Section 2, *Exhaust Hoods and Exhaust System Design*, and Section 3, *Practical Design of Sand-Handling Ventilating Systems*, are published together in another pamphlet.

Demand for know-how for controlling dust and ventilation in gray iron, malleable, steel, and non-ferrous foundries has prompted the AFS Dust Control and Ventilation Committee to make available sections of the Manual as soon as they are printed. All sections will be combined in one volume to be published in the fall. Schedule of Section Availability

Sec.	Title	Date
1	*Introduction to Principles of Foundry Ventilation and Foundry Hygiene Problems*	now
2	*Exhaust Hoods & System Design*	now
3	*Practical Design of Sand-Handling Ventilation Systems*	now
4	*Sand Preparation, Core Making, and Molding*	June
5	*Melting and Pouring*	June
6	*Cleaning Room*	August
7	*Housekeeping & Miscellaneous Control Measures*	June
8	*Radiation*	June
9	*Welding and Wood Working*	now
10	*Dust & Fume Collectors; Fans and Motors*	June
11	*Maintenance and Testing*	now
	Appendix	June

Section 1, *Foundry Hygiene Problems*, contains definitions and theory of particulate matter, characteristics of air flow, descriptions of types of exhaust systems, explanation of the necessity of make-up air systems, description of extraneous air movement and recirculation; the method of supplying air, and descriptions of general, comfort, and natural ventilation.

Section 2, *Exhaust Hoods and System Design*, gives in detail a new method of designing an exhaust system by use of a nomograph. A typical installation problem is worked out using the included nomograph. A problem is worked out by the old method with the friction chart. In addition, piping design is explained.

Section 3, *Practical Design of Sand-Handling Ventilation Systems*, contains information necessary for designing such a system. Many photographs and drawings illustrate applications to various phases of sand handling. Procedure for balancing an exhaust system is given.

Section 1, and Sections 2 & 3 are published in separate pamphlets of 34 pages, 8¼ x 11¼, paper bound; each is available to AFS members for $1.50, nonmembers, $2.50. Write to American Foundrymen's Society, Book Department, Golf & Wolf Roads, Des Plaines, Ill. Postage will be prepaid if remittance accompanies order.

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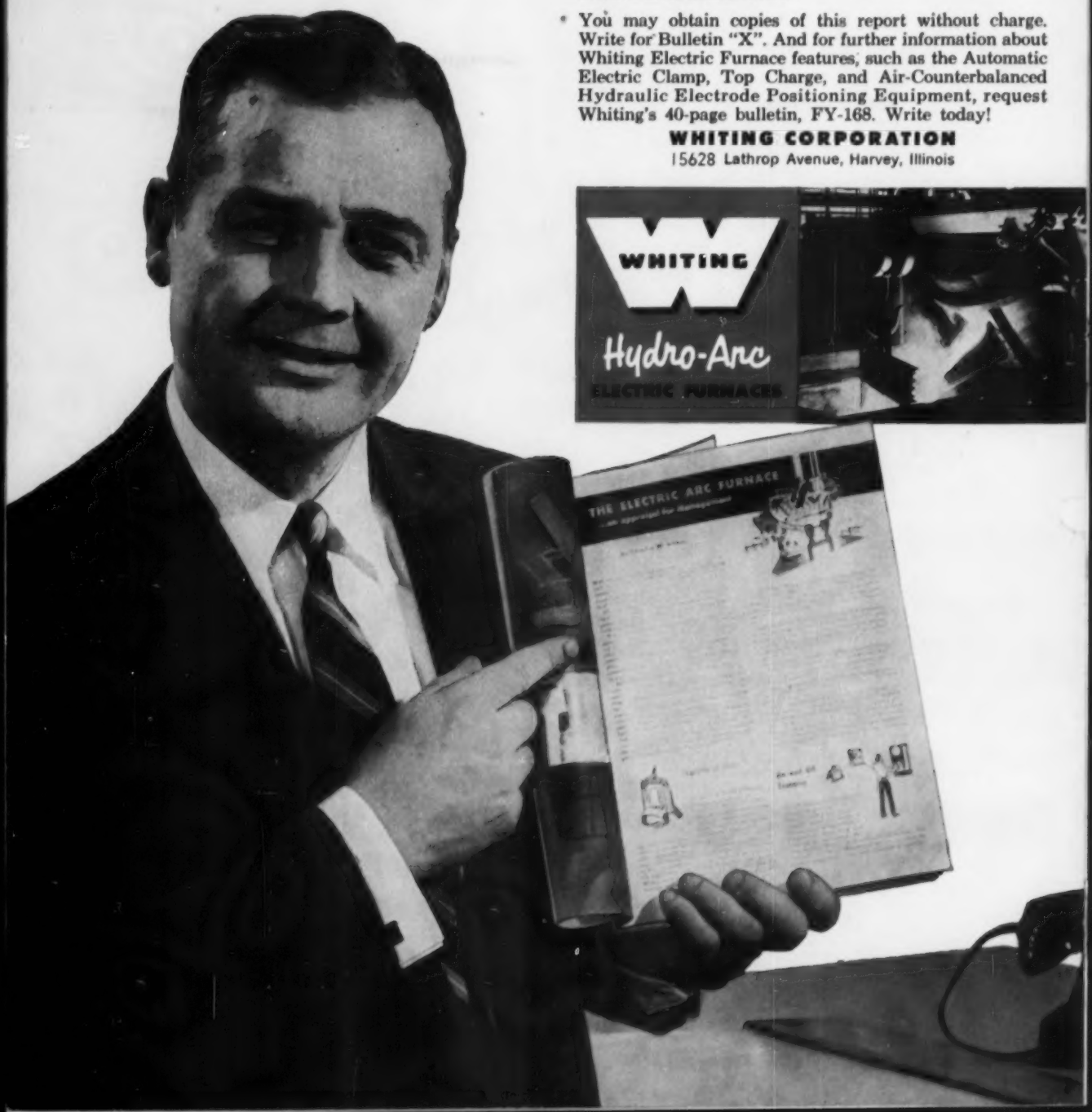
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